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*Sheila Mixdorf Senior Systems Analyst,
John Deere Engine Works
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E N D V A N T A G E.

CIO

VOLUME 5, NUMBER 16

SPECIAL ISSUE: THE CIO-100

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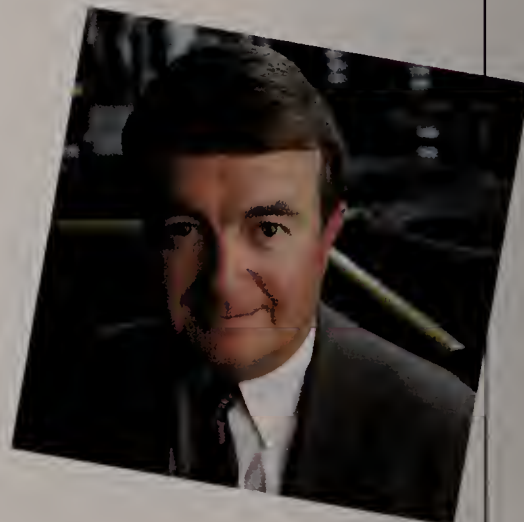
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**THERE ARE TWO PLACES
WHERE COMPLEX
NETWORK INTEGRATION
PROBLEMS CAN BE
WORKED OUT.**

YOUR PLACE.

As surprising as it may seem, there are many clone companies that boost profit margins by not hiring enough designers and doing dangerously little testing. What does it all mean? It means that your network is the unofficial test site for their server.



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Unfortunately, those engineers were unable to make it to the above photo session.

Nor could the specialists who created the

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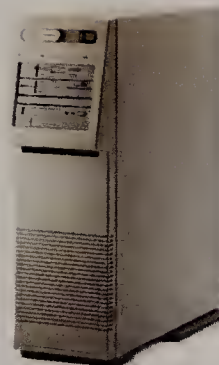
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HIGH-PERFORMANCE ESSAYS AND PROFILES (continued)

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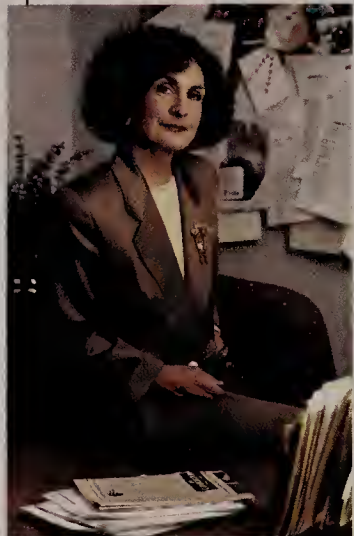
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When our editorial staff began evaluating ideas for our fifth CIO-100 at the beginning of this year, we were particularly impressed by the "doing more with less" theme so prevalent in today's competitive environment. We wondered how organizations managed to be efficient, high-quality producers while garnering impressive returns for investors. As in the past, we began with a distinguishing business characteristic and then examined IT's contributions. "The Shape of Excellence," beginning on Page 26, and "Behind the Scenes," on Page 78, explain our methodology in detail.

Special Projects Editor Allan E. Alter did a spectacular job organizing the team effort. Special thanks are due to Senior Writer Thomas Kiely, major deputy on the project, whose tireless legwork kept everyone focused.

We were delighted when Wal-Mart and its vice president of IS, Bob Martin, welcomed *CIO* Contributing Writer David Freedman to corporate headquarters in Bentonville, Ark., for an extensive profile of the company and its IT strategy.

Senior Writers Meghan O'Leary and Richard Pastore provided their usual insight and perspective. Contributing writers Kathleen Melymuka and Leslie Goff rounded out the editorial coverage. Writer/Researcher Megan Santosus monitored our survey results, and Mina Ahn, our editorial assistant, provided aid to everyone on the staff as needed.

As usual our crack editing team, led by Managing Editor Lew McCreary and ably assisted by Associate Editors Abbie Lundberg and Leigh Buchanan, kept everyone on their toes.

Finally, Assistant Art Director Moira Gillis, aided by Art and Design Director Mary Marshall and Design Associate Kim Morneau, created a distinctive look that makes the CIO-100 an issue people will want to keep.

And a very special thanks and appreciation to our 1992 CIO-100 winners—the information executives, their IS teams and the management of their organizations—who prove that good information in the hands of good people creates winners.

Marcia Blumenthal

P.S. Our first issue of 1993 will feature companies that have been able to demonstrate the bottom-line result of aligning IT solutions with the enterprise's strategies. We invite our readers to participate. Guidelines for submissions are on Pages 91 and 92.

Aligning IT with corporate goals is seen by many as the top challenge facing CIOs. Here's your chance to show that progress is being made on this front.



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AD92



Welcome to the fifth annual CIO-100. Each year our editorial team analyzes the business environment to determine what theme is uppermost in the minds of executives. With the help of a stellar panel of judges, the staff selects 100 companies that exemplify achievement in the designated area.

Given that the mandate of the '90s is to do more with less, this year's CIO-100 focuses on high-performance companies. The organizations that made the cut represent a healthy

cross-section of government and industry sectors. Not only do our winners excel when measured by traditional performance metrics such as return on equity and revenue growth; they have also developed organizational infrastructures that fully leverage their people, assets, finances and processes.

In our search for the high-performance 100, we discovered an intriguing methodology developed by Chicago-based consultant A.T. Kearney. The Kearney approach examines the relationship between the shape of an organization (defined by such factors as degree of centralization and business-unit autonomy) and its costs and performance. Using this methodology, we were able to look at performance from an overall managerial point-of-view consistent with CIO's mission to report on IT issues, trends and solutions from a management perspective.

I would like to take this opportunity to congratulate each of the organizations that withstood the rigorous scrutiny of our judges and editorial staff to earn a place in the high-performance 100. The executives managing these organizations and the visionary CIOs who have deployed IT to achieve or exceed performance goals are truly exemplary.

Enjoy this issue. I hope you will find, as I did, that we can all learn from the examples of such high-performance companies as Wal-Mart, Microsoft and Novell.

Wayne L. Wray

P.S. Registration is well underway for the next CIO Perspectives Conference, "The Process of IT: Organizing for Success," to be held Oct. 11-14 at the Boca Raton Resort & Club. Additional information is available by calling our toll-free registration center at 800 366-0246. We look forward to seeing you there!

Coming In CIO

Small Companies, Big Risks

CIOs must frequently gamble mission-critical systems on untested products, either to achieve a modicum of competitive advantage or simply because nothing more venerable exists. Thankfully, there are several strategies, some common and some crafty, to help minimize the risks and maximize the rewards.

War Stories

Outsourcing may be a smart business move, but it can be hell for the IS staff and managers whose lives are shaken by the deals cut by outsourcing vendors and their clients. Some lose their positions; others become the vendor's employees and must cope with changes in their jobs, work culture, benefits and even identity.

CALL FOR SUBMISSIONS

ROI is on everyone's mind. Our January 1993 issue will feature companies that have been able to align IT with corporate goals and demonstrate its bottom-line payoff. We invite our readers to send in their own success stories. Guidelines for submissions are on Pages 91 and 92.

It's curious what passes for interoperable computer systems these days.

Lately, many computer makers are claiming, "Our systems are open." But their customers are asking, "Open to what? *Your* computer environment? Or ours?"

The point is well taken. Because computers should work with systems already in place, the customer's existing investment. And with systems yet to come, the customer's future investment. It's a big assignment—*interoperability*, enabling information to move freely across different computer environments.

Permit us to suggest a simple test. Ask your computer providers if their commitment to interoperability extends to a few of their offerings—or all of them. Ask if their commitment ends with UNIX® and PC operating systems—or anchors their systems architecture and corporate strategy. Total interoperability does not yet exist, but a total commitment to interoperability puts Unisys at the head of the industry.

"No supplier is doing more to respond to its customers' requirements for interoperability across an entire product line than Unisys," reports the



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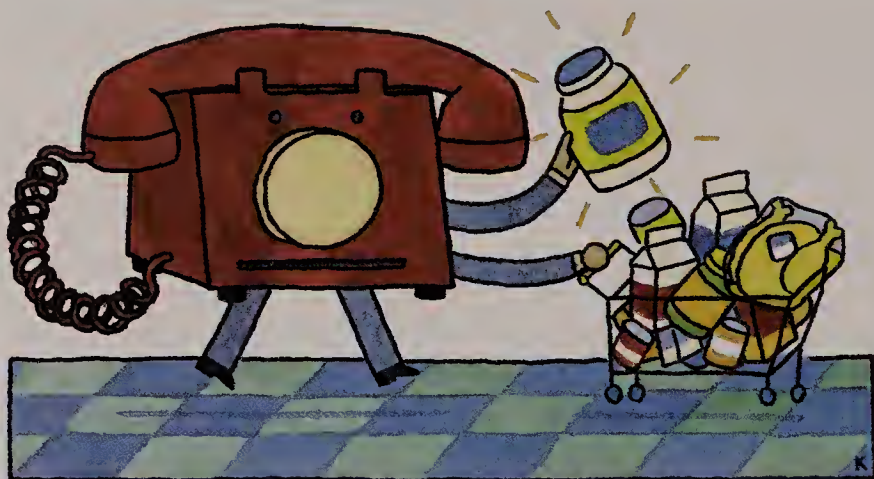
TELEPHONE TRANSACTIONS

DIAL M FOR MAYONNAISE

We've all gotten used to letting our fingers do the walking. But now, thanks to a new service called ScanFone, they can do the shopping and the bill-paying as well.

Forget about mile-long lines snaking down narrow super-

market aisles. ScanFone users can find everything from soup to nuts in a 6,500-item catalog provided by participating groceries and order it in the comfort of their own homes. Using a light pen, customers scan the bar code accompanying each item; se-



CAREER MOVES

DONALD N. BARKSDALE has been named director of sales information systems for the Nabisco Foods Group in Parsippany, N.J. Barksdale was formerly group manager of management information systems sales and marketing for Nabisco's Planters and LifeSavers unit. He joined the company in 1988 as project manager of financial systems.

DR. RICHARD MANDELBAUM has joined Polytechnic University in Brooklyn, N.Y., as the director of its Center for Advanced Technology in Telecommunications (CATT). Mandelbaum succeeds Ivan Frisch, who was appointed provost of the university. Mandelbaum plans to explore new educational partnerships for CATT within the local corporate community and beyond.

GLENNON C. HEADLEY JR. has been appointed vice president of information services for Republic Insurance group of companies in Dallas (a subsidiary of Republic Financial Services Inc., which is a member of the Winterthur Swiss Insurance Group).

DAVID W. SMITH has assumed the newly created post of vice president of information technology at PPG Industries in Pittsburgh.

RICHARD A. LINDEN was named vice president of management information services of MMI Companies Inc. of Deerfield, Ill. He will be responsible for developing information and technology strategies, managing the company's local and international data communications network, and providing software development and consulting. ■

lections are verified on a 16-character LED display screen. After reviewing the order, users specify a time and date for delivery and pay by running a credit card through the magnetic-strip reader. And there's no need to worry about gristly pot roast or sprouting potatoes: Orders are filled by professional food shoppers charged with selecting the best cuts of meat and the freshest produce.

To pay bills, users scan bar codes on a specially designed sheet with listings for each monthly bill, including credit cards, utilities and installment loans. They enter the amount on the keypad and then scan the date for payment. The bill is paid on the specified date, and the user's account is debited accordingly.

ScanFone customers will also be issued bar-coded catalogs from a number of mail-order companies, such as Crate & Barrel. The basic monthly service charge, which covers bill-paying and shopping, is \$9.95. There is also a per-delivery charge of \$9.95 for groceries.

Customers receive a technologically enhanced telephone with a standard touch-tone keypad, 16-character LED display panel, magnetic-strip credit-card reader and a light pen that scans bar codes. The service is being offered by US Order of Herndon, Va., in partnership with Sun Microsystems, Hewlett-Packard, Verifone (a maker of transaction-automation systems) and Shoppers Express, a supermarket home-delivery network. It is currently available in 16 cities.

While the house-bound and paper-resistant should welcome the convenience offered by ScanFone, the U.S. Postal Service will likely be less enthusiastic. One of the Postal Service's largest sources of income is mailed bill payments, so the electronic transactions enabled by ScanFone will further eat away at its already declining revenue. ■

ONE TIME ONLY

Judging by the latest compensation figures for information executives, the recession is over. Sort of. The annual salary survey conducted by Edward Perlin Associates Inc., a New York-based consulting firm that specializes in compensation management, reveals that compensation growth for IS execs has returned to pre-recession levels.

However, the gains are showing up more in performance incentives in the form of bonuses than in base salary. In fact, the survey shows, growth in base salary has declined for 1991-1992. This year salary growth across 25 IS executive positions averaged only 1.8 percent, whereas bonuses grew an average of 5.3 percent—for a total of 7.1 percent. In 1990-1991, companies responded to the economic downturn by slashing bonuses virtually across the board, in 18 of 25 positions. This year the situation flipped, and bonuses were boosted in 19 of 25 positions.

The five CIO-equivalent executive positions reported aggregate base salary growth of 4.2 percent and growth in bonuses of 10.4 percent.

These results underscore the recent trend in compensation of making growth in base salary a permanent (though variable) factor, while correcting for declines in corporate performance by trimming or eliminating bonuses altogether.

"This flexibility helps to contain fixed costs," said Edward Perlin, "and it allows management . . . to reward performance without building it into a permanent compensation structure." ■

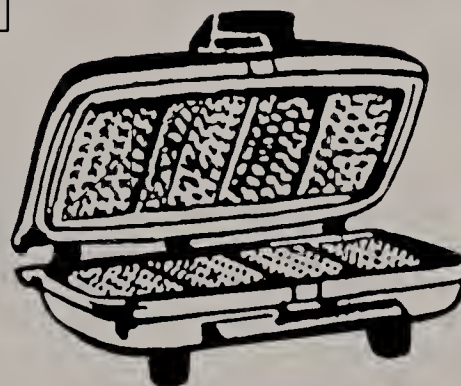
Does UNIX have a role in big business?

A



If my Big Iron applications will run on it, why not? I've got too much tied up in mainframes to start from scratch.

B



I'm still waffling. I won't commit until UNIX is proven in the business environment.

C



I'm only interested if it's free.

D

None of the above.

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INTELLECTUAL ASSETS

SKANDIA'S DIRECTOR OF KNOW-HOW

There's a lot of lip service being paid to treating people and information as valuable corporate assets. So we were skeptical when we heard that the Skandia Group, a multinational financial-services and insur-

ance company headquartered in Stockholm, Sweden, had created the post of "Director of Intellectual Capital." A conversation with Leif Edvinsson, who has held the position since it was created in August 1991, showed that our skepti-

cism was unfounded.

Edvinsson said that his mission is to "translate IQ into ECU" (European Currency Unit, the proposed common currency of the European Community). His role is to identify, cultivate and capitalize on Skandia's intellectual assets—which Edvinsson defines as the experience and knowledge of its employees; information about its products, customers and markets; and the company's organizational structures, business procedures and information systems. As director of intellectual capital he works with three corporate functions: human resources, business development (which includes marketing) and information systems.

"These hidden assets are the root system for the growth of financial capital," Edvinsson said. "[Skandia's] growth requires that we care for, cultivate and capitalize upon these intangible assets. IT helps [do this] by capturing experience or organizational [processes] and transporting skills through

networks between business units around the world."

One example of capitalizing on intellectual assets is a system that enabled Skandia to get a new branch in Berlin up and running in six months, instead of the company's usual two years.

Known as "the Prototype," it contains all the technology and information on business processes and other areas required to start up a new office. The Prototype provides Skandia's agents with descriptions of the company's financial products and administrative procedures for starting a new office. It also provides expert systems to help guide day-to-day operations and the networking capabilities needed to connect the new office with Stockholm.

Edvinsson believes the Prototype will help Skandia maintain its growth rate of 40 percent and expand its markets into new countries. (The Skandia Group currently operates in Scandinavia and seven countries outside of Scandinavia, including the United States.) ■

IF ZIPPY WORE POCKET PROTECTORS...

Genius popping out of computer terminals, a giant frog that keeps his system bug-free, a group of programmers clustered around a fortuneteller who informs them that

It's a world where shipwreck survivors find themselves lost at sea in a rubber raft with a mainframe and no surge protector. Where users of a not-very-fault-tolerant system get



"We're using a four-tiered system — PC to mini to Mr. Smoothy to mainframe."

the glitch is in a faulty cable at the Denver office.

Welcome to the world of Rich Tennant.

Tennant's cartoons have appeared in numerous publications (including *Computerworld*) and corporate newsletters (for IBM Canada, Xerox, Lotus and Compaq, among others). His new book, *The Fifth Wave*, recounts the continuing love/hate relationship between man and machine.

a pie in the face. Where software is tested for compatibility, performance and how far it can be thrown across the parking lot.

The Fifth Wave is available at book stores for \$6.95. And if the paperback's format looks familiar, that's because it's put out by Andrews & McMeel, publishers of "Doonesbury," "Calvin & Hobbes," and that granddaddy of science-nerd humor—"The Far Side." ■

NEW INKLINGS

Sarah Stambler's *Marketing With Technology News* is a new monthly newsletter available by facsimile only from TechProse Inc. in New York.

The publication covers businesses' use of alternative electronic media to market and deliver their products. Recent issues have dealt with fax broadcasting, fax-on-demand systems, and cellular and FM wave communications.

One- to three-page sample issues of the newsletter are available via fax-on-demand by calling 800 882-4237. Information on free subscriptions is also available by fax. Dial 703 506-9095, mailbox 2005060079.

IDG Communications of Boston (which also publishes *CIO*) recently introduced *The Integrator*, a newsletter devoted to the outsourcing business. The 12-page monthly publication looks at outsourcing business trends from the perspective of users and vendors. Recent issues have reported on global outsourcing opportunities, outsourcing desktop computing, acceptance of outsourcing in the traditional IS shop and possible vendor shakeouts.

The newsletter's normal U.S. subscription rate is \$395 (a charter subscription costs \$295; international subscriptions are priced at \$435.) The business office can be reached at 617 423-9030. ■

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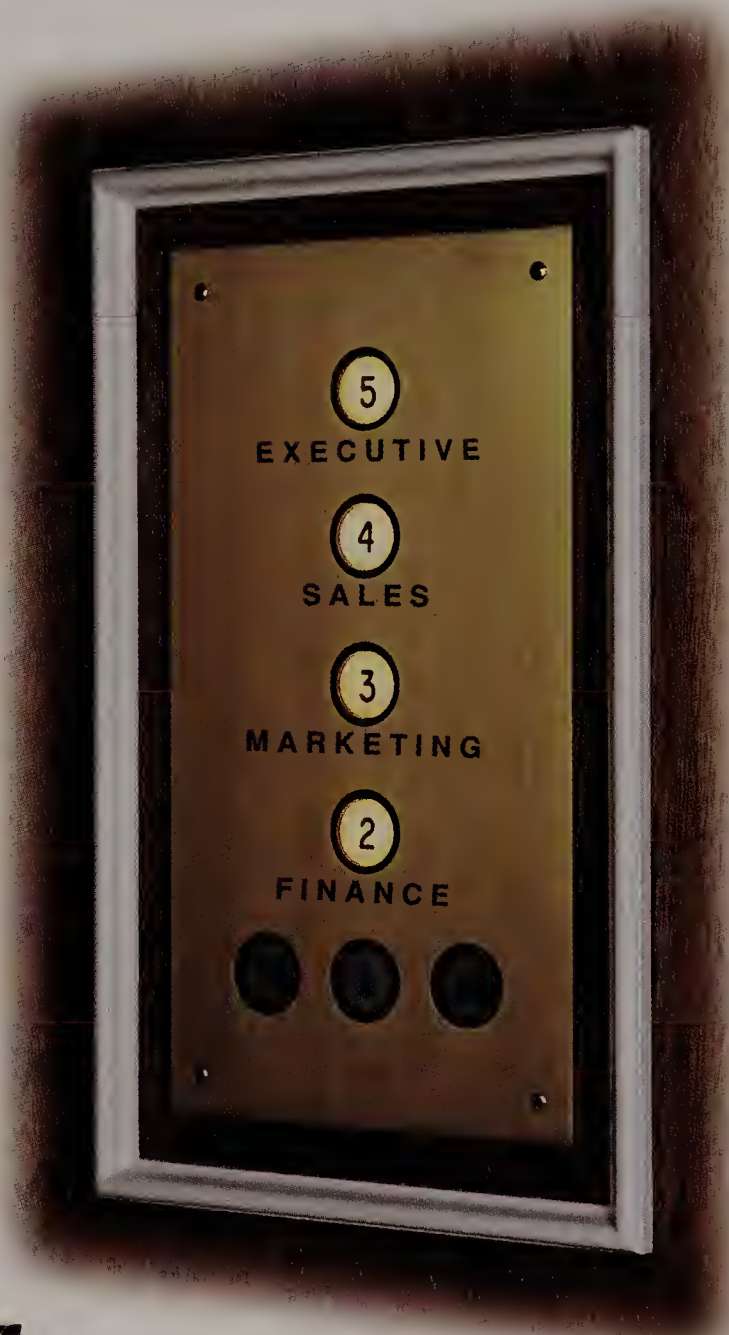
■ **Integrated applications.** Departmental solutions for sales, marketing and finance support rapid prototyping, applications distribution and bottom-line results.

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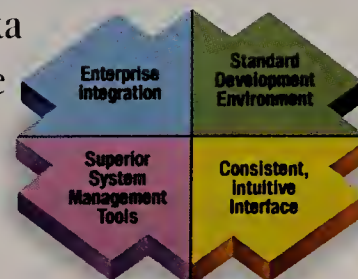
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TRENDLINES

THE UNIX MARKET

AN EASING OF OPEN WARFARE

Two dominant Unix clans and longtime antagonists seem to be inching their way toward peace. The Open Software Foundation (OSF), based in Cambridge, Mass., and Unix Systems Laboratories (USL—an independent subsidiary of AT&T), based in Summit, N.J., represent two distinct factions who have harried and taunted each other in the Unix market since the late 1980s. For users, the Unix wars have been a real turnoff. Who needs incompatible "open" systems?

Since 1990 the two camps have eyed ways to cooperate—and thereby expand the Unix market. USL licensed the OSF's Distributed Computing Environment (DCE) and Distributed Management Environment (DME), which is essentially a software layer that sits atop an operating system and facilitates interoperability. Then in June, OSF President David Tory attended a USL product-release fete, where he spoke warmly of a new era of cooperation.

The announced product that Tory upstaged—System V, release 4.2 of Unix (SVR4.2)—is touted by USL as a streamlined, easy-to-use operating system for the desktop, and the bridge from end users to distributed cor-

porate and departmental systems. Available this fall, SVR4.2 will run on a 16 MHz Intel 386SX portable or desktop computer (it requires 4MB of memory and a 60MB hard disk), as well as SPARC and MIPS-based platforms. According to USL, the multiuser, multitasking and communications capabilities of Unix are rolled up into an operating system that will help users downsize applications from their mainframes and upsize the power of their PCs. SVR4.2 also supports OSF's popular Motif interface.

"If you look at where Unix started, it has come a long way with SVR4," said Kate Fessenden, senior market analyst at the Meta Group, a Westport, Conn.-based research and consulting firm. "It has commercial, industrial strength." She described Tory's appearance at the June USL press conference as a "deep bow that OSF had to make. Basically, USL won this round of the Unix war."

But talk of peace may be premature. The two camps will cooperate in the areas where their strategies overlap—application-level interoperability—but in all other respects, the two factions will continue to battle for market attention. ■

CORRECTION

Our June 1 feature "Birth of a Salesman" erroneously reported that New York Life Insurance Co.'s profits were falling. This is not the case. According to company officials, New York Life's consolidated surplus for 1991 grew 14 percent to \$3.3 billion, a performance that prompted Chairman and CEO Harry G. Hohn to call 1991 "one of New York Life's best [years]." CIO regrets the error. ■

WHO TO SUCCEED IN BUSINESS

Unless you're a third-world dictator, you know that succession planning is a critical and often difficult organizational reality, vital to a company's uninterrupted success. Working from the belief that no team is forever, MicroTrac Systems Inc. of Newton, Mass., is offering software that lets human resources executives gather personnel data and turn it into a point of action for short- or long-term executive job filling.

SuccessPlan can handle as few as 50 and as many as 50,000 employee records, identifying departments and direct reports and evaluating possible succession candidates as "ready now," "ready in the future," or "not ready." The product highlights promising employees who are blocked from advancement by incumbent managers, managers poised for a move who have no one to replace them, and positions for which there is no obvious

successor. The company promises that SuccessPlan will reduce the money spent on recruitment, lost opportunities and outplacement, while improving employee retention, satisfaction and productivity. ■



KEEPING IT LEGAL

If you want to stay on the right side of the law, it helps to have a good upbringing, an active conscience and the new Software Management Guide from the Software Publishers Association.

The SPA guide is designed to combat piracy by helping companies audit their current software policies, educate employees and establish procedures to purchase, register, upgrade and back up computing systems. It includes an Internal Controls Analysis Questionnaire, a Software Audit Guide and the SPA's Eight-Point Program for Ensuring

Compliance. Also in the guide are all of the SPA's current anti-piracy materials including DOS and Macintosh versions of SPAudit.

"MIS managers have long since recognized the difficulty of managing their software resources and staying within the law," said SPA Executive Director Ken Wasch. "We are now providing them with a useful tool to help monitor their internal software practices, so that companies may become software-legal."

The guide costs \$80. For more information, or to order, call 202 452-1600. ■

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TRENDLINES

LANGUAGE LESSONS

In an effort to foster interest in computer science among elementary and secondary school students, a group of educators is promoting the teaching of a new, streamlined programming language.

SCHEME, which was developed at MIT in the mid-1970s, is derived from LISP and emphasizes concept rather than syntax. As a result, proponents say that SCHEME enables beginning students to write and understand advanced programs months ahead of students who use more-cumbersome languages.

"The way that computer science is introduced to students seriously jeopardizes the country's future as a competitor in the technology marketplace," said Terry Kaufman, president of Schemers Inc., a Fort Lauderdale, Fla.-based publisher of SCHEME instructional products that he cofounded with three high school teachers. "Many students are so turned off by their early experiences that they simply opt out of any further study."

SCHEME is widely taught throughout Europe and Japan and is increasingly replacing Pascal in introductory computer-science courses at colleges such as UC Berkeley, Columbia, Cornell, Johns Hopkins and MIT. However, secondary schools have been slow to adopt SCHEME.

"Too many high schools show an alarming lack of interest in the disparity between what they are teaching and current thinking at the college level," Kaufman said. "Such complacency is a recipe for disaster." ■

PC's PLAYHOUSE

The Computer Museum in Boston is home to a new exhibit designed to showcase the versatility of the PC.

Toys: The Amazing Personal Computer opened in June and features 35 interactive stations that use multimedia, music-making, pen-based systems, CD-ROM, graphic design, games and desktop publishing to demonstrate how the PC can be used for more than word processing and spreadsheet applications.

Developed in conjunction with the Boston Computer Society, the \$1 million permanent exhibit of-

fers novices and experienced users alike the opportunity to sample a variety of computer systems. Visitors to the

exhibit can explore a virtual reality world, mix and record music in a computerized sound studio, create cartoons with digitized sound and graphics, fly a DC-10, draw on the wall using a paint program and a laser-guided wand or perform explosive chemical experiments on a videodisk.

Sponsors of the exhibit include Bill Gates, Steve Wozniak, Apple Computer

Inc., Digital Equipment Corp. and the Kapor Family Foundation. ■



QUICK RESPONSE

IMPERFECT ALLIANCES

Most American retailers acknowledge the benefits of forming quick response partnerships with their suppliers. But only a few are aggressively making the changes to their corporate cultures and operating environments that are necessary to implement QR. So concludes a survey conducted for Coopers & Lybrand by Louis Harris and Associates.

Quick response is to the retail supply chain what just-in-time is to manufacturing. It can improve customer service and lower inventory and operating costs. C&L identifies six initiatives that are essential to successful QR efforts:

- Sharing inventory data among trading partners
- Sharing sales and marketing data among trading partners
- Using bar coding to track sales and inventory
- Enabling customers to order through EDI
- Managing stock replenishment for key customers
- Using automated stock-replenishment systems

Only 28 percent of the manufacturers and 38 percent of the retailers surveyed had undertaken at least four of these initiatives. While the majority had some of the individual elements in place (and many even said they were implementing a QR system), "a surprising number view the alliance as merely a means of speeding up orders and deliveries..., not as a partnering approach to accelerate operational processes," said C&L Partner Len Olin.

The report is based on interviews with 210 general

managers of strategic business units within consumable-products manufacturing companies and 79 general merchandising managers of retailers, all with revenues over \$500 million. A significant number of respondents, particularly among the manufacturers, said they will never share sales and marketing information with suppliers or implement automated stock-replenishment systems (seven out of 10 retailers said they currently share sales, marketing and inventory information with their suppliers; only four out of 10 manufacturers do so).

"Most consumer-products companies are currently focused on their short-term concerns, product quality being chief among them," Olin said. "And while they're right to be concerned with quality, they are missing the mark by ignoring longer-term partnering opportunities that can do more than any other activity to increase productivity across the entire supply chain." ■



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For organizations of all stripes, the '90s are shaping up into the decade of doing more with less. Achieving efficiency without damaging the long-term vigor of the enterprise is an impressive accomplishment indeed. Most high-performers, whether big or small, diversified or centralized, keep their managers—and their information systems—focused on the basics of the business.

THE 1992 CIO-100 WINNERS

3M **54**
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Adobe Systems Inc. **58**
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Conversion **58**
Apple Computer Inc. **44**
Arnold Industries Inc. **64**
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Bancorp Hawaii Inc. **68**
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Corp. **44**
Boeing Co., The **44**
Cabletron Systems Inc. **58**
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Inc. **54**
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General Electric Co. **50**
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Limited Inc., The **54**
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Microsoft Corp. **44**
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Offshore Logistics Inc. **64**
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Pentech International
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Philip Morris Companies
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Phoenix, Ariz. **74**
Portland, Ore. **74**
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Rochester Telephone Corp. **50**
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Seattle **74**
Solelectron Corp. **58**
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Stride Rite Corp. **54**
Sunnyvale, Calif. **74**
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Washington State **74**
Wells Fargo & Co. **68**
Wilmington Trust Co. **68**
Wisconsin **74**
Wm. Wrigley Jr. Co. **44**

*Page numbers refer to the first
page of the article(s) in which
the company is mentioned.*

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"buyer's scorecard" showed that developers ranked the IEF first among all I-CASE products in the study, particularly in the areas of application quality, programmer productivity, and value for the dollar.

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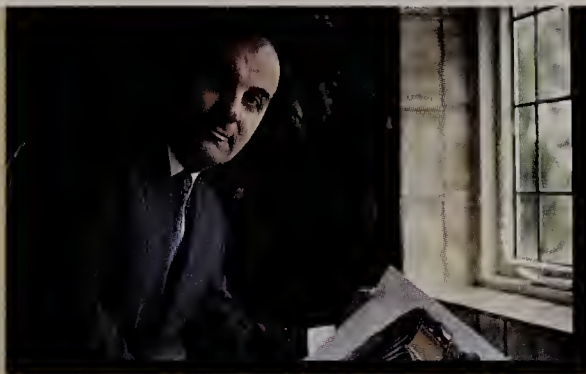
 **TEXAS
INSTRUMENTS**

Target. Rolls-Royce. Canadian Airlines. Sony.



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Richard F. Connell
VP, Information Technology
AETNA



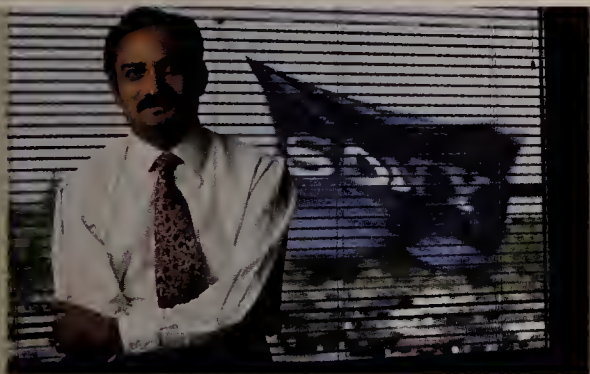
"MERLIN is mission-critical—the most far-reaching business systems initiative we've ever undertaken. Over 400 transactions are in production, with 800 more to be added in the next three months. We could not handle this scale and complexity without IE/IEF."

Wal Budzynski
Head of Operations, Systems/Computing
Rolls-Royce Aerospace



"With previous methods, we would have had to compromise on an 'okay' 10-screen Lease Accounting system. With the IEF, our users got everything they wanted—an outstanding 40-screen system—in the same time. They are requesting the IEF for all future systems."

Tom Jeffery
Sr. VP, Information Systems
Target



"The IEF offers dramatic improvements in productivity, yet it's easy to learn. One example: We trained 23 developers, including 18 new hires, and then completed a large order processing system—300 transactions—all in only 20 months."

Venkat (Vinnie) Tiruvilumala
Director, CPC/CPPC Information Systems
SONY Corporation



"We used an IEF frequent flyer template to build our 'Canadian Plus' system. A major redesign, estimated at 4-6 months using previous methods, took less than a month. Now we're providing better customer service, and maintenance costs are greatly reduced."

Bill Palm
President, Canadian Technology Services
Canadian Airlines



"Our new Customer Order Services Marketing Information System—over 500 transactions and 250 entities—is in production. Quality is excellent and our users are very pleased. Dedicated people armed with the IEF advantage have made COSMIS a success."

James R. Engle
Director, Systems and Programming
Rhône-Poulenc Rorer



"Your new IEF tutorial was a way to quickly become familiar with the IEF and see how the IEF will allow quality systems to be built very quickly. I feel I now know how to build systems using the techniques described."

Roger Strand
Application Development Consultant
First Federal Lincoln



"The IEF tutorial is very well done. I feel comfortable with this software and I have acquired the skills to build simple systems. The tutorial is a very fast and effective means of evaluating the capabilities of the IEF."

Margaret Kubaitis
Research Programmer, IS&S
University of Illinois



"The IEF tutorial is put together very well and quickly illustrates how to construct a system using the IEF. It gives one the basics to start getting the job done. I feel I am prepared now to build simple systems using the IEF."

K. E. Peacock
Data Administrator
City of Saskatoon, Saskatchewan



THE SHAPE OF EXCELLENCE

.....

Today's organizations are under fire to improve quality, "delight" customers, streamline business processes, cut costs and boost profits—all at the same time. This year's CIO-100 explores the impact organizational structure has on an enterprise's costs and performance.

BY THOMAS KIELY

Senior managers are feeling the heat to improve the performance of their organizations. Cycle times must quicken, customer service and quality must improve, business processes need to be streamlined, costs need further cutting, and more effort must be made to squeeze inefficiencies out of the organizational structure. Recession or no, shareholders are restive: Boost those profits, tickle up those market valuations. CEOs read about their compensation in angry editorials. CFOs are grappling with cost structures for organizations undergoing rapid change. And CIOs are under pressure to do more, much more, with less.

We live in interesting times, as the curse goes. Given the mood of the day, *CIO* decided that it might be useful to investigate the avenues

and byways of exemplary performance: Which are the nation's most effectively run organizations, and what can be learned about IT's contribution, if any, to the achievements of these organizations?

Digging into the topic, we found that top-flight companies keep their managers (including those in IS) focused on the basics of the business. Most high-performance organizations—big and small, diversified and centralized—have taken to heart the call to focus on core competencies. Information is the lifeblood of high-performance shops, but the degree to which technology is employed to manage and deliver information varies. The size of the organization is a factor; so are its design and business. Successful CIOs pay keen attention to tailoring the platform to fit their companies' shape, culture and mission.

Before we could begin our search for the best and brightest, we had to define the sine qua non of performance. With the aid of several advisers from industry and consulting firms, we compiled a matrix of nine measures that gauge how companies manage their people, assets, finances and processes. Apart from traditional measures such as return on equity, growth of revenues over time and revenue per employee, we also looked at such factors as overhead costs, return on net assets, inventory turns (for manufacturers), the ratio of administrative expenses to overall expenses (for service companies) and debt. (See Page 78 for a full discussion of our methodology.)

Zacks Investment Research Inc., a Chicago securities research firm, ran a database of over 6,000 publicly traded companies through our performance-measurement gauntlet, producing several lists by industry grouping and company size. We assembled a final list of about 350 top hitters, compensating for anomalies

and differences. For instance, if we had simply lumped all industrial companies together, a welter of nimble manufacturers would have displaced industrial giants like General Electric. Similarly, we segregated financial services because performance measurements for this industry differ significantly from those used to rate manufacturing and service companies.

But numbers can't tell the whole story; we relied upon a blue-chip panel of experts to cull the best of the best from among the merely top-notch. (See Page 78 for a list of judges.)

For governmental organizations, we relied entirely upon judges to make the selection. Governments' stakeholders don't usually get the kind of financial information that corporations must quarterly provide, though a few intrepid exceptions appear among this year's CIO-100 winners.

AS PICKY and conservative as we were in the selection process, when it came to organizing our high-performance 100—well, we got radical. With two exceptions (financial services and government), we have grouped this year's winners primarily by size and shape, not by industry.

This may seem perverse, especially since the topic is corporate performance. After all, each industry contends with business issues unique to its acre of the terrain: Airline CEOs bit their nails during the Gulf War, but their peers in the retail-clothing business just kept grinning. Isn't it unfair to measure the returns of healthy industries against sick ones?

Maybe. No major air carrier appears on this year's list (but much smaller Mesa Airlines does), no automaker, no oil giant, no mogul from the metals industry. But industry-minded studies can be blinders. They narrow a reader's attention to the competition between a company and its tangent peers, and to the group's diverse reactions to their shared business factors. We wanted a broad-

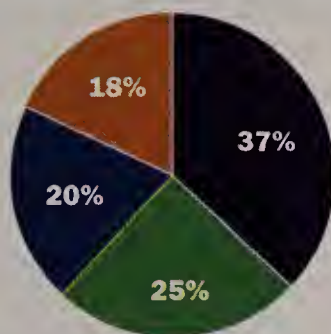
er perspective, something more managerial and less business-centric.

Benchmarking offered a precedent. Wise benchmarkers don't limit their searches for best practices to their own industries; they find models across the spectrum. We sought a similar cross-industrial perspective

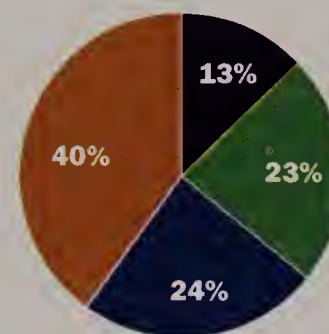
THE I.S. PLAN

CIOs were asked to rate the importance of specific efforts to their IS plans

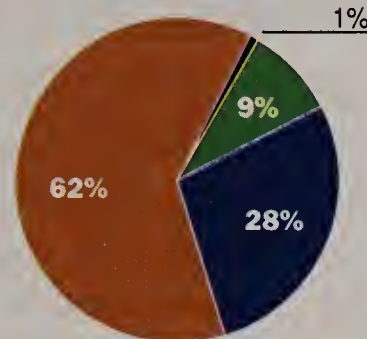
BUSINESS REENGINEERING



DOWNSIZING



OUTSOURCING



Extremely Important
Important
Somewhat Important
Not Important

Number of respondents: 67

and eventually adopted a methodology developed by A.T. Kearney, a management consultancy based in Chicago. For the last six years, Kearney has been studying the relationship between the shape of a corporation and its organizational costs and performance. The consultancy uses its findings—gleaned from two in-depth studies of over 35 major corporations, and several smaller studies—as the jumping-off point for its benchmarking practice.

Essentially, Kearney divides the world of large organizations into three types: functional, portfolio and combination. Functional companies are centralized operations. They are organized by functional areas, such as manufacturing, marketing and IS. Individual business areas and divisions report to corporate and have little

A surprisingly large number of CIOs consider outsourcing not important to their IS plans (only 1 percent considered it extremely important).

I.T.'S CONTRIBUTIONS

In what ways does information technology improve the efficiency and performance of this year's CIO-100 companies? In just about every way imaginable, according to 67 respondent CIOs, who were asked to answer yes or no to a listing of choices.

Nearly all agreed that IT helps their organizations' performance by improving productivity, providing superior customer service, improving business processes and empowering employees. A majority of respondents also said that it is used to provide actionable information, avoid

defects and errors, and create more effective relationships with suppliers.

In what ways isn't IT being used to help efficiency and performance? Only one choice got a big negative response: Half said that it is not used to provide knowledge of competitors. And while many people assume that one of IT's main contributions to efficiency is to enable a reduction in headcount, a third of respondents said it did not contribute in this way, with many CIOs stressing that headcount reduction was not a goal of their IT efforts.

Wise benchmarkers don't limit their searches for best practices to their own industries; they find models across the spectrum. We sought a similar cross-industrial perspective.

autonomy; corporate managers call most of the strategic shots.

At the other end of the organizational spectrum are portfolio companies. These are decentralized, usually composed of distinct business units that operate much like separate enterprises. Individual business units have a lot of autonomy, and they share few functions. The corporate staff is usually quite small. Good decentralized companies, often reaching out through multiple channels to multiple customer groups with a variety of products, are more flexible and nimble than their centralized counterparts, and they are able to maintain closer ties to their customers. They are akin to an assortment of small, entrepreneurial ventures existing under the same roof. Examples of high-performance CIO-100 portfolio companies are Johnson & Johnson, Merck and General Electric.

But decentralized portfolio companies duplicate functions and parts of the organizational infrastructure in each unit, and that can be costly. Centralized functional companies are leaner and meaner: One product line or division typically accounts for two-thirds or more of the business, and distribution channels are narrow. High-performance functional companies, such as McDonald's and Wal-Mart, consolidate and manage

enterprisewide business processes and costs centrally. The dark side of functional companies is sluggishness and bureaucracy.

Combination companies are hybrids of centralization and decentralization. Organized into business units like portfolio companies (to gain the entrepreneurial benefits of decentralization), many combination-company business units nevertheless share functions in a bid to achieve some of the cost benefits of a centralized organization. For instance, one unit of a combination company may cut the payroll for all units in the corporation; a few units might share a logistics system. Combination companies might also centralize financial systems, human resources and marketing, but decentralize product development and manufacturing. (Badly managed hybrids adopt the worst, rather than the best, aspects of the purer strains.) CIO-100 combination companies include 3M, Walt Disney and Philip Morris.

THIS TRIPARTITE categorization enables Kearney clients to benchmark against similarly organized companies. (In Kearney's estimation, it makes little sense for a portfolio company to measure cost structures against a centralized benchmark.) For CIO, this approach offered a management perspective on performance. What can be learned about performance by viewing it through the lens of organizational design? How do the factors that tally up to high performance differ in centralized and decentralized companies? Where do IS executives fit in?

CIO's writers and editors began to tackle these questions as they interviewed or surveyed large companies on our metrics-produced list to assess whether they were functional, portfolio or combination organizations (successful small companies are typically focused and centralized, so we grouped them separately). The names of the 85 top-ranking large-company semifinalists were then turned over to

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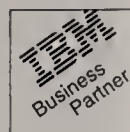
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THE CIO ROLE

CIOs were asked to name their top priority in helping to improve their organizations' efficiency and performance

- Align technology with the business strategy **24%**
- Implement state-of-the-art solutions **12%**
- Provide and improve information access **12%**
- Enhance customer service **9%**
- Create links within the organization **7%**
- Train & empower employees **7%**
- Create links with external customers **6%**
- Enhance current systems **4%**
- Support business reengineering **4%**
- Act as change agent/catalyst **4%**
- Educate business units about IT **3%**
- Evaluate emerging technologies **3%**
- Implement standard systems & architecture **3%**

Number of respondents: 66

CIOs aren't too concerned with the radical (reengineering and acting as a change agent scored low) or with basics like implementing standards and architectures. Rather, they are focusing on evolutionary, quality-enhancing refinements.

our judges, along with the names of 62 small companies and 24 financial services firms. (About a dozen large companies that should have been among the semifinalists, including Abbot Labs and Service Merchandise, rebuffed us and were dropped from consideration. While

we might have guessed their shape with the help of analysts, we decided that guessing wrong was worse than ignoring them. The overwhelming majority of semifinalist organizations graciously responded to our requests and sometimes spent a considerable amount of time with us as we split hairs about their organizational design.) Armed with the judges' final selections, our writers explored the nuances of IT and the CIO's role in each of the three large-company organizational categories.

In functional high-performance companies, the CIO is usually a top corporate officer with a great deal of control. Standards are strict and

budgets tightly managed, and systems are in place to manage processes and costs across the company.

But in our era of organizational flux, say many consultants, the mood among organizational designers favors decentralization. In Kearney's most recent benchmarking study (completed last April), 10 of the 14 companies examined had decentralized management responsibilities during the last five years.

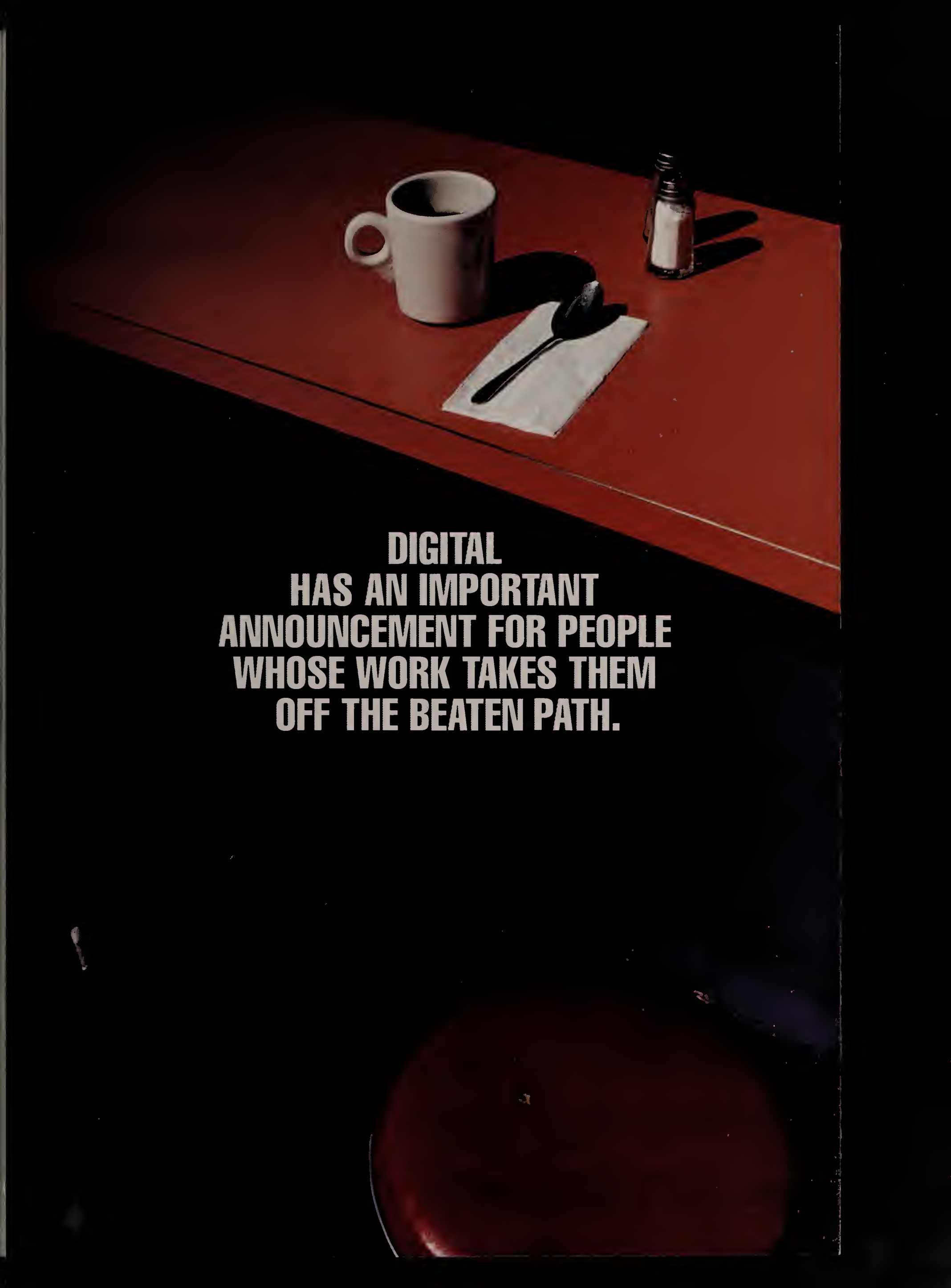
Globalization is a major driver of this trend, according to Mark Paulson, a Kearney partner and director of the firm's organizational effectiveness efforts. Even companies that already do 50 percent of their business abroad expect to dramatically beef up their international presence in the next decade, and they know they can't manage that from

headquarters. Other consultants name quality, flexibility, speed and competitiveness as the brass rings that decentralizers hope to grab.

Intriguingly, Kearney has found that centralized functions are not always the most cost-effective; that, in fact, decentralization can sometimes improve a company's financial performance. Paulson notes that some companies have successfully moved the management of formerly centralized functions out of the home office and into the business units, where local managers find ways to squeeze costs. In some cases, a single business unit acquires the function and serves the whole corporation; in other instances, the function is shared across units. "Even though decentralization implies additional costs, we have found that local managers—by aggressively managing the function—can deliver superior financial performance," Paulson said. In fact, he added, a few companies following this strategy have managed to cut costs by as much as 20 to 30 percent over five years.

Portfolio companies included among the high-performance 100 have found that autonomy is a business dynamo. With authority and accountability pushed down to street level, the organizations' managers can focus on making and selling rather than on administering corporate functions. How do IS managers in these companies keep things humming? Decentralized to match the organization, autonomous IS units in portfolio companies work closely with their respective businesses to provide solutions for the here and now. Corporate standards and centralized IT priorities don't get in the way. The corporate CIO, if the company has one, acts more like a consultant than a general.

BUT PAULSON believes that combination companies are the model other organizations, centralized or decentralized, will slowly evolve toward, because the balance of flexibility and costs is potentially so favorable. Just as

A still life photograph of a white mug, a salt shaker, and a spoon on a red table. The mug is white and filled with a dark liquid. The salt shaker is small and clear with a white cap. The spoon is silver and lies on a white napkin. The table is a vibrant red. The background is dark and out of focus.

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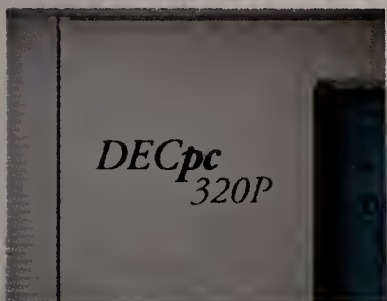
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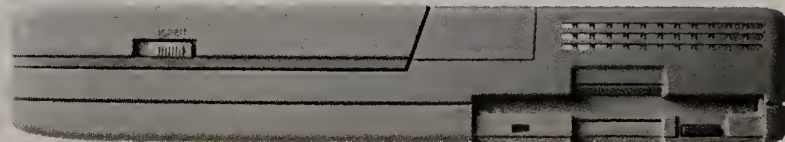
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Mouse:	Three-button Mouse
Software:	MS-DOS® 5.0 and MS-Windows™ 3.1

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Memory:	3MB Memory (exp. to 13MB)
Storage:	122MB IDE Hard Disk 3.5" 1.44MB Floppy
Resolution Mode:	1024 x 768 SVGA Adapter with 512K Video RAM
Display:	14" VGA Color Monitor
Keyboard:	101-key Keyboard
Mouse:	Three-button Mouse
Software:	MS-DOS 5.0 and MS-Windows 3.1

Selected Options:

- Additional 2MB Memory. Add \$100 • Additional 4MB Memory. Add \$200 • Upgrade 122MB Hard Disk to 245 Hard Disk. Add \$200 • Upgrade to a 14" Multi-sync VGA Color Monitor. Add \$100 • Upgrade to a 16" Multi-sync VGA Color Monitor and 1MB of VRAM. Add \$600



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Microprocessor:	Intel 486sx running at 20MHz
Memory:	4MB Memory (exp. to 32MB)
Storage:	122MB IDE Hard Disk 3.5" 1.44MB Floppy
Resolution Mode:	1024 x 768 SVGA Adapter with 512KB Video RAM, upgrades to 1MB for 256 color support
Display:	14" Multi-sync VGA Color Monitor
Keyboard:	101-key Keyboard
Mouse:	Three-button Mouse
Software:	MS-DOS 5.0 and MS-Windows 3.1

Selected Options:

- Additional 4MB Memory. Add \$200 • 1.2MB 5.25" Floppy. Add \$75 • Upgrade 122MB Hard Disk to 245MB Hard Disk. Add \$200 • Upgrade to a 16" Multi-sync VGA Color Monitor and 1MB of VRAM. Add \$600



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Memory:	2MB Memory (exp. to 8MB)
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Modem:	2400 bps Data
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Mouse:	Logitech™ TrackMan® Portable
Software:	MS-DOS 5.0, MS-Windows 3.1 and Stacker 2.0

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THE MAGAZINE FOR INFORMATION EXECUTIVES

centralized companies are decentralizing, some portfolio companies are consolidating services. Take IT for instance. "We've done studies that suggest that the cost of IT relative to sales in a portfolio company can be as high as 3 to 4 percent," said Paulson. "In a combination company it can be 1 percent to 1.5 percent of sales, and that's across the company."

Organized into business units like portfolio companies (to gain the entrepreneurial benefits of decentralization), many combination-company business units nevertheless share functions in a bid to achieve some of the cost benefits of a centralized organization.

IS managers at high-performance combination companies report that some corporate IT services are centralized, some decentralized—the mix and the degree depends upon the business. Moreover, the balance in combination organizations between what reasonably can be centralized and what ought to be decentralized will ebb and flow. IT is a case in point. While some companies are adopting decentralized client/server architectures, other companies are reconsolidating IS. "It's a dynamic process," said Howard Anderson, president of the Yankee Group, a Boston-based research and consulting group. "Whatever your solution is, it doesn't work."

"But technology isn't the restriction," said Dave Norton, president of the Renaissance Strategy Group, an IT consultancy located in Lincoln, Mass. "CIOs need to use their imaginations to figure out the right mix of centralization and decentralization. Technology may change to mirror the organization, but it also goes beyond that role. It can create an infrastructure to change the organization."

Small companies aren't as organizationally complex as Fortune 500 giants. (If they were categorized by the Kearney method, nearly all of them would salute the functional flag.) But performance and organi-

zational design are related in companies of all sizes. Small firms excel by keeping their sights focused on their niche businesses and by wowing customers. They also sit on costs. Strategic partnerships are rife among them, as are outsourcing arrangements (some even outsource their manufacturing). Often, technology (and technology managers) are considered unnecessary and costly. As the company grows and becomes more complex, however, those costs begin to pay off. We considered small industrial and small service companies separately.

Financial services companies, on the other hand, are gluttons for technology. In a 1991 technology survey conducted by *American Banker*, a trade journal, and New York-based consulting firm Ernst & Young, it was estimated that the entire value of the banking industry's hardware and software technology is about \$200 billion. High-performance financial services companies are clearly focused, have distinct corporate personalities and deliver personal service—and they use technology to achieve their goals.

Governmental bodies are a different breed of organization from a profit-making corporation. Still, to be efficient and effective, government agencies must also have lucid goals and remain focused on the issues that are important to achieving them. Information is crucial to quality service in government. Like Baldrige winners, top-performing governments track and measure their performance assiduously. Technology, within some bounds, plays a role in helping to shape and deliver information, and in some cases it creates new services.

Our high-performance issue opens with a profile of Wal-Mart, the late Sam Walton's powerhouse retailer. As this first in-depth look at the company's IT practices shows, technology can be an able accomplice in the drive to improve corporate performance, but only if managers continue to push their systems to do more, better. ☐



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RETAILING IN REAL TIME

Wal-Mart's retail juggernaut rolls out systems that allow it to roll over the competition, including a replenishment process that's the ultimate in shelf-help and the industry's fastest checkout operations

BY DAVID FREEDMAN

You meet the most interesting people in Wal-Mart stores. Like, for example, Wal-Mart Executive Vice President of IS Bob Martin and his fellow IS managers. They go to as many as 10 stores a week, all over the country. Are they managing the rollout of a new system? Holding on-site strategic plan-

ning sessions? No; they're more

likely to be stacking boxes in the storage room, putting toothpaste on the shelves or chasing down shopping carts in the parking lot. Mark Schmidt, vice president of technology and telecommunications, spent a recent Saturday night performing such duties. "I was driving by one of the stores and I just couldn't resist," explained Schmidt. "The stores are where the action is."

It's not that the stores need the help. Martin and his cohorts want to immerse themselves in the nitty-gritty of store operations for one reason:

They are obsessed with applying technology to squeeze out every hint of unnecessary cost, wasted time and customer annoyance they can dig up. "The first thing everyone asks you when you get back from a store is, 'Got any suggestions?'" said Randy Mott, a co-vice president of systems development. "If the an-



Wal-Mart managers rely on the good ideas of the company's front-line "associates," who are encouraged to voice suggestions or criticism.

PHOTOGRAPHY BY KENT HANSON

swer is no, you haven't paid for your trip."

Some people might say that Martin and his crew have already done enough. The company's databases are so quick to pick up buying patterns, and its replenishment system is so efficient, that it seems as if items are on the stores' shelves before customers realize they want them. Meanwhile, an array of front-of-the-store systems whirls customers through checkout with disorienting velocity.

None of this, however, satisfies Martin. "When you're ahead, you always find more to do," he said. "It never stops."

Competitors should find that a scary thought. For well over a decade, Wal-Mart has been growing at an average of more than 25 percent a year, rocketing past a relatively stagnant K mart this year to become the United States' largest retailer. Its most recent sales figures make it a \$40 billion company, and few observers are dismissing the late Sam Walton's prediction that the company he founded would reach \$125 billion by the end of the 20th century. Wal-Mart has stores in 43 states, and in recent years the company has been opening an average of 170 stores per year; it opened

The industry average time between replenishments of any given product is two weeks, but Wal-Mart's average is twice a week, and stores can often get daily deliveries based on the previous day's orders.

36 on a single day last year. Wal-Mart has twice the return on sales that K mart does, and three-quarters the overhead; it has less than half the overhead of Sears.

ACCORDING TO most experts, Wal-Mart's IS efforts should get much of the credit. Take the replenishment process, the company's showpiece operation. The basic premise is that Wal-Mart doesn't inventory large quantities of items to satisfy predicted consumer demand. Instead, it lets actual day-to-day sales data automatically trigger orders to manufacturers, orders that are whisked to stores with unrivaled speed. "The idea," said Martin, "is to let the market control our business."

The system is fed with data from POS systems and employees carrying radio-linked hand-held computers at shelf side—data that is beamed by satellite from every store to headquarters in Bentonville, Ark. In the case of hundreds of particularly fast-moving items, this data is monitored online by the manufacturers themselves, who note impending shortages and ship off orders to any or all of Wal-Mart's 19 regional distribution centers, or sometimes directly to the stores themselves. In other cases, Wal-Mart's own buyers are alerted to potential shortages and quickly notify manufacturers and

distribution centers. In either situation, items don't get shipped to the centers until the stores need them, and when they are shipped, they don't hang around long; most orders are typically on their way to the stores within hours of arriving at the distribution centers. The industry average time between replenishments of any given product is two weeks, but Wal-Mart's average is twice a week, and stores can often get daily deliveries based on the previous day's orders, paring down inventory costs to the lowest levels.

Wal-Mart's replenishment system was touted in a recent *Harvard Business Review* article, not merely as a model for the retail industry but as a model for what *all* organizations must do to compete in the coming decade. It is certainly serving as a model for Wal-Mart's largest competitors, who are doing what they can to imitate it. Martin and company aren't worried. "K mart's trying to do things we did four years ago," said Martin. "They talk about doing EDI with 2,000 vendors. We're sharing point-of-sale data with 2,000 vendors."

Bragging to the outside world about such accomplishments is something of a new experience for Martin, the Lou Grantish manager who took over the top IS spot seven years ago and became the first Wal-Mart IS manager to join the executive committee. Like most Wal-Mart managers, he is obsessively focused on the workings of the company and rarely stops to worry about what the press or Wall Street is saying about his organization. But apparently there is something about watching competitors get credit for lesser achievements that gets to you after a while, which is one reason Martin agreed to submit to his first in-depth interview. But his need to be constantly forging ahead is so ingrained that he couldn't resist repeatedly turning the tables and grilling the reporter to see if there wasn't some new nugget of insight he could glean and use to advantage in his work. "I really like to



Karena Bakewell (right), a Wal-Mart systems analyst, demonstrates a new customer check printer for (l.-r.) Mark Schmidt, Store Associate Gwen Harris and Director of Operations Rick Dalzell.

get that outside perspective," he explained.

Martin doesn't like to act without the close participation of the rest of his IS management team, which includes Schmidt, Mott and Doyle Graham, the other co-vice president of systems development. Despite the existence of ordinary-sounding titles for external consumption, all of these managers are careful to refer to each other, to the 700 people in the IS division, and to everyone in the entire company as Wal-Mart "associates." It is an important point of pride to Martin and other managers that most of the good ideas they've implemented came from the lower ranks and the field—"the firing line," as Martin calls it. If an employee doesn't

get the opportunity to voice a suggestion or criticism in the quarterly company meetings or the monthly divisional meetings, then he or she can feel free to show up unannounced at the weekly management meetings to be heard. Recently, said Schmidt, managers had decided to roll out new laser printers throughout the company. But when one employee sent a note saying he thought the rollout would waste money, Schmidt called an immediate halt to the program and is now working with the employee to reassess the decision. "They'll stand right up and take me on, and probably get applauded for it," said Martin. "Well, they'll take on Doyle, anyway."

WAL-MART HAS been technology-savvy since the 1960s, when it operated one distribution center. Even then, the company realized it needed an efficient replenishment system not only to minimize inventory costs but to keep sales up—you can't sell something you don't have in stock—and, most importantly, to keep



customers happy. "One of the key points of customer satisfaction is whether or not the store has the items you want in stock," said Martin. But as the company started to grow by leaps and bounds, it had to face a complex problem: How could it maintain the economies of scale and expertise that a centralized structure provided while allowing individual regions and stores to retain the autonomy needed to best serve local customers? In other words, how could Wal-Mart cost-effectively manage itself "one store at a time," as the company tends to put it.

Part of the answer was, of course,

"We believe the whole value chain is driven by the customer, and any money we save is used to fund the next level of improvements."

—Bob Martin

Wal-Mart's new inventory and shelf management system is discussed by (l.-r.) Systems Designer Marion Roller, Store Associate Kevin Stover, Doyle Graham, Randy Mott and Systems Designer Carol Basnaw.

IS. The heavily computerized replenishment system now stands at the core of the company's strategy. By lowering its inventory costs, Wal-Mart can offer lower prices; the lower prices bring in more customers, which allows the company to buy in greater volume and build better systems, which allows it to lower prices more, and so forth. The strategy has worked so well that Wal-Mart finds it doesn't have to do much by way of promotional advertising, which saves it even more money; it runs one modest sale per month, versus one per week at K mart. "It's no accident that the things we do to lower costs are the same things that make customers more satisfied," said Martin. "We believe

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How People Are Using Lotus Notes

<i>Strategic Planning</i>	<i>Project Management</i>
<i>Sales Management</i>	<i>Sales Presentations</i>
<i>Industry Newswire</i>	<i>Policy Handbook</i>
<i>Customer Service Tracking</i>	<i>Electronic Mail</i>
<i>Forms Routing</i>	<i>Financial Profiles</i>
<i>Quality Management</i>	<i>Telemarketing</i>
<i>Contract Library</i>	<i>Technical Support</i>
<i>Correspondence Tracking</i>	<i>Job Postings</i>
<i>User Group Discussions</i>	<i>Credit and Collections</i>

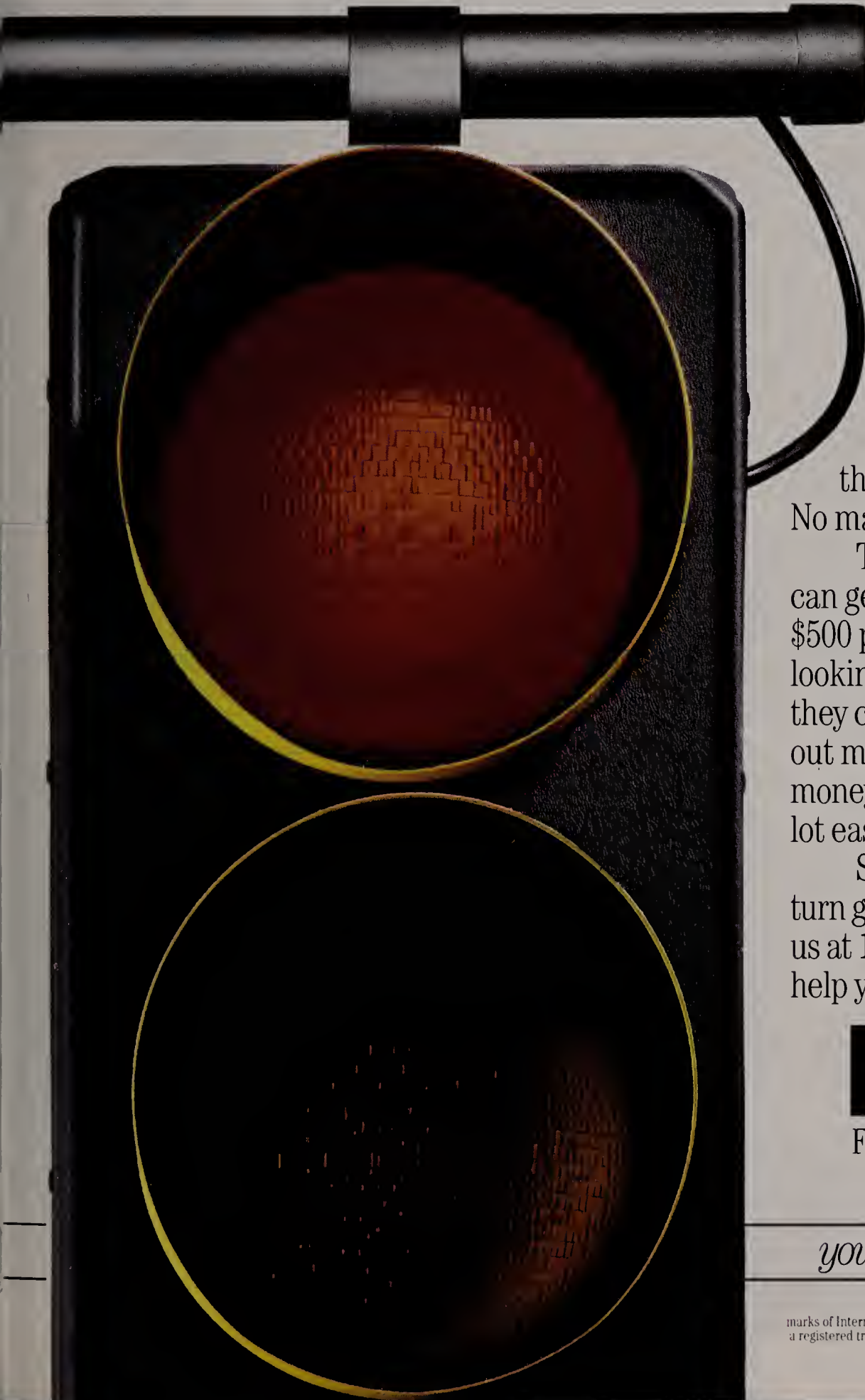


and more. There are small and large companies, in fact, that have bought Notes to solve a specific problem, only to discover that it answered other needs as well.

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Serving as a crucial link in the replenishment system is a 1.3-terabyte relational database of purchase information—the largest of its type in existence—fed by a vast stream of satellite data from all 1,600-plus stores. About 3,400 Wal-Mart suppliers have some sort of link to the company's computers, and about 1,000 of these have full online ac-

cess to all information in the purchase database pertaining to their products. The database enables the identification of customer buying patterns down to a single display in a particular store.

The benefits of these systems go beyond getting goods to stores faster and at lower cost; they also make it possible to achieve the right product mix at each store while retaining economies of scale, which is a crucial element of Wal-Mart's strategy. To that end, the company em-

ploys a multilevel approach to buying. At headquarters, a small army of corporate buyers monitors workstations to keep track of trends across the country. The workstations enable buyers to analyze day-to-day sales by any number of criteria, including how an item is displayed and what the seasonal weather variations are for a particular location.

Geographically-specialized buyers make it possible to customize purchases to suit regional tastes. Wal-Marts in Louisiana, for example, carry bags of "crawfish boil," which would be a sorry waste of shelf space in Idaho.

In addition, 32 geographically-specialized buyers make it possible to customize purchases to suit regional tastes—so that Wal-Marts in Louisiana, for example, carry bags of the mixture of herbs known as "crawfish boil," an item that would be a sorry waste of shelf space in Idaho.

But regional customization doesn't go far enough, according to Wal-Mart's thinking. Explained Mott: "You might find that turtleneck shirts have an average sell-through of 70 percent in stores throughout Florida, but if you look at individual stores you discover the figures range from 30 to 90 percent. If you're not managing at the store level, you're missing a lot of opportunities." Thus store managers are provided with information that lets them analyze the buying habits of their customers in terms of 2,500 different "traits," such as preferences in hobbies, home decoration, health care, and so forth. The managers are then free to tailor store merchandise to fit, and even to re-allocate entire aisles.

TECHNICAL PROFILE

Wal-Mart is the largest retailer in the United States, operating some 1,600 discount general-merchandise stores. The company is also building several "supercenter" stores that combine a conventional Wal-Mart store (typical size: about 100,000 square feet) with a supermarket. If the company merely maintains its first-quarter pace—analysts expect it will do even better—it will rack up profits of about \$1.5 billion on sales of \$45 billion in 1992. The company employs nearly 400,000 people.

Wal-Mart is generally credited with operating the most advanced and effective information systems in the retail industry. Its stock-replenishment system, which is driven by point-of-sale data and enables the company to bring merchandise from manufacturers to its shelves within a few days, has given the giant retailer a significant competitive edge by lowering inventory costs while keeping shelves fully stocked. In addition, the company uses its buying data and satellite links between stores and headquarters to tailor the product mix in individual stores while retaining centralized economies of scale. Other systems make the check-out process the industry's fastest. Wal-Mart's IS division comprises 700 people, 300 of which work on systems development.

Large Systems: Wal-Mart operates several IBM ES/9000 and 3090 mainframes under the MVS/ESA environment. These systems are supported by 1.8 terabytes of online disk storage.

Client/Server Systems: Some 1,800 NCR '386-based workstations at headquarters, along with another 1,200 workstations at vendor locations, are supported by Compaq '486 System Pros and Hewlett-Packard 9000/987s acting as servers. The System Pros run DOS and Netware, the H-P machines run a version of Unix, and the workstations operate in the Windows environment. All the systems have access to a 1.3-terabyte relational database maintained on a Teradata system.

Store Systems: 70,000 IBM, NCR and Telxon terminals and workstations are supported by some 3,200 minicomputers from IBM, HP and NCR running Unix and the Informix DBMS.

Networks: A wide area network is operated over a Hughes Integrated Satellite Business Network (including data, voice and video). Local area networks are based on token ring and Ethernet architectures.

Software: Most of Wal-Mart's applications are custom-built; some incorporate Microsoft's Excel spreadsheet.

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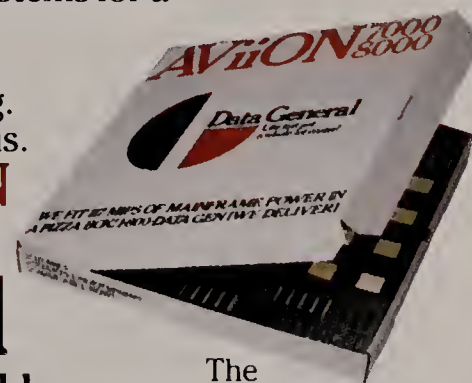
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Even that's not specific enough for Wal-Mart. The company is now gearing up to tailor its offerings for individual customers. The IS department is in the process of build-

two seconds. A new system speeds check writing and approval by taking a customer's blank check, filling it out with a printer, and reading the magnetic number at the

"Everyone remembers the last thing that happened to them in a store, and that's the checkout. We don't just want faster-moving lines—we don't want any lines at all."

—Martin

ing a customer database that will allow sales clerks to call up a variety of information on a customer to speed service and promote cross-selling in departments such as eye-care, pharmaceuticals and auto repair, as well as to facilitate the registration of product warranties and the sale of hunting licenses. Can Wal-Mart break it down any finer? Martin won't rule it out. "No one in retailing has yet figured out what the limits are to micro-managing," he said. "But one thing I do know is, if some retailer is going to put a dog item on its shelves, it isn't going to be us."

BESIDES OFFERING its customers the right products, Wal-Mart wants to make sure that once customers put those products in their shopping carts they can get out of the store as quickly as possible. "Everyone remembers the last thing that happened to them in a store, and that's the checkout," said Martin. "We don't just want faster-moving lines—we don't want any lines at all."

For starters, the company has installed particularly fast and error-free laser scanners, backed up by store pricing systems that rarely fail to bring up a correct price. If the system's price is incorrect, the clerk can immediately override it, a time-consuming task at most stores. Eschewing credit-card-authorization service bureaus in favor of an in-house system, Wal-Mart has cut the waiting time for credit-card approval to an average of

bottom of the check for verification; all the customer has to do is sign.

There's more. Anyone who's ever been trapped behind a shopper who is also a store employee filling out paperwork for his or her discount will appreciate the Wal-Mart system, in which the employee simply swipes a card through a read-



er. And shoppers on layaway plans can make all their payments at a regular checkout counter just as they would any other purchase; if the payment is their final one, the storage room is automatically notified and the item is on its way to the front of the store within seconds. To obtain a refund on a purchase, a customer need only wave a receipt, and the check is printed on the spot. Without a receipt, the process takes only a few seconds longer, while the clerk checks a database to make sure the customer isn't a frequent receiptless returner. "Our intent is to provide a completely hassle-free environment," said Graham.

In addition, he noted, the ability to handle any sort of transaction without the irritations of paperwork and balky systems reduces the stress on clerks, contributing to their ability to be friendly to customers. "If you have a laborious refund system, that sort of thing goes right through the associate base to the customers," he explained.

All these systems have unquestionably provided Wal-Mart with a competitive edge. But is that edge sustainable?

"People say you reach a point where everyone can do what you do, and the playing field becomes level," said Martin. "We say nonsense. There's tons more we can do. We still have a lot more inventory than we need to run the business. We're not sure we can get to the point where one item comes in the back door every time one goes out the front, but we can get closer. The trick is to do it without losing the economies of scale you get from having trucks pull up every day at the same time with the same kinds of loads for every store."

To further pare inventory delays and costs, Wal-Mart has to get manufacturers to change the way they do business, said Martin. Right now, for example, many manufacturers adapt to Wal-Mart's demands for rapid response to orders not by gearing up their plants for fast production but by building up their own inventories, and thus actually increasing their own costs—costs that eventually get passed on to the consumer.

"An attitude change has to take place at manufacturers," Martin said. "Technology is opening up opportunities, but their cultures are holding them back." At Wal-Mart, in contrast, the culture is propelling the company forward. As of yet, there is no end in sight. 

David Freedman is a freelance writer based in Brookline, Mass.

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LARGE FUNCTIONAL COMPANIES are most often centralized around core business functions and can thereby benefit from enormous economies of scale. The challenge in such organizations is to use technology as a tool for transforming the constraints of a rigid structure into the strengths of a fluid, responsive ecosystem.

FLIPPING THE CENTRAL SWITCH

BY LESLIE GOFF

.....

A look at the list of CIO-100 winners in the large functional category might lead one to speculate on how these companies survived before the advent of computer networks.

Indeed, of the 18 companies on the list, fewer than half predate what could be viewed as the dawn of modern business computing. Information systems pull these large functional companies together, serve as the backbone for the entire corporation and facilitate a centralized management style. In the pursuit of both the efficiencies of centralization and the opportunities of local flexibility, the CIO is a pivotal player, on a par with the top

executives of critical business units and often reporting directly to the company president or CEO.

"We're not responsible for systems so much as we're responsible for what happens in the business," said Rich Castor, who functions as vice president and CIO at US Healthcare, of Blue Bell, Pa., a large pro-

vider of managed health care. "IS is a glue across the company that makes new products work."

These CIO-100 winners use technology in a way that is perhaps more practical than innovative. The goal is to overcome the inherent disadvantages of rigid structure by simulating the nimble responsiveness of much smaller companies.

Although corporate IS sets strict standards and maintains tight budgetary control, it also must be responsive to the big picture. Applications are geared to provide not only economies of scale, but also the information that workers need to make better decisions.

Consider Blockbuster Entertainment, based in Ft. Lauderdale, Fla. About half of Blockbuster's 2,000-plus video stores are company-owned and the rest franchised, but the systems setup is identical in each store. The system manages day-to-day interactions with customers, and also gathers information that corporate uses in inventory management, distribution, marketing and planning.

According to Wilbur Smither, Blockbuster's vice president of information systems, the goal is to ensure the same 10-second checkout and overall quality of customer service at each location. The system also captures invaluable, store-by-store data on customer tastes. MicroVAXes in the stores have dial-in capabilities to an IBM ES/9000 at headquarters, where internally developed software analyzes the data, which is shared across departments. Thus product managers can interact with the marketing group on promotions

or closely scrutinize the performance of particular titles.

Centrally controlled cross-functional efficiencies, applied on a local basis, have contributed to Blockbuster's rapid growth. The first store opened in 1985; there were 238 outlets by the end of 1987. Since then Blockbuster has grown by roughly 450 stores per year, and it plans to open between 350 and 400 stores worldwide in 1992.

◀ HONOR ROLL ▶

AST Research Inc.
Apple Computer Inc.
Avon Products Inc.
Blockbuster Entertainment Corp.
Boeing Co., The
Conner Peripherals Inc.
Cooper Tire & Rubber Co.
Food Lion Inc.
W.W. Grainger Inc.

Lands' End Inc.
Mac Frugal's Bargains/
Close-Outs Inc.
McDonald's Corp.
Microsoft Corp.
Nike Inc.
Procter & Gamble Co., The
U.S. Healthcare Inc.
Wal-Mart Stores Inc.
Wm. Wrigley Jr. Co.

IS's LIGHT TREAD, DEEP TRACKS

Cooper Tire & Rubber Co., of Findlay, Ohio, has grown 400 percent in the last 10 years, topping \$1 billion in revenue for the first time last year. However, thanks to what Vice President of IS John Mitchell calls an entrepreneurial style in a highly centralized organization, Cooper has increased headcount by only 50 percent.

The information systems staff, for example, has fewer than 100 people to support the company's two divisions: the tire division, which accounts for 85 percent of sales; and the automotive products division, which makes such rubber automotive components as sealing systems, radiator hoses and vibration-control devices.

Both divisions could be thought of as individual business units, Mitchell said. Each has its own sales and marketing, engineering and cost accounting functions; but financial, purchasing and IS functions are shared. The 20 IS staffers in the automotive-products division report to the division president, who has a dotted line to Mitchell. ("Dotted lines are very prevalent in our organizational chart," Mitchell said. "We think of ourselves as family oriented.")



JOHN MITCHELL: *a functional family*

Like a family in which the members may have their own rooms but the house is a shared responsibility, management participation and communication across departments and divisions are essential to Cooper's centralized structure.

Mitchell stepped into his role in January after seven years at the company, and last May he joined other top executives in determining the company's strategic direction. "A few years ago IS would not have been on the list of critical strategies," he said. "Now we are. Our visibility is on the rise."

The group's rising visibility is due in part to applications that go to the heart of Cooper's corporate culture by increasing cooperation and communication across departments. A supercomputer-based CAD program used in the tire division's product engineering department, for instance, helps streamline manufacturing efforts. Engineers use a Floating Point Systems machine tied to a DECnet network to run finite element-analysis programs that analyze stresses and strains as a model tire rolls over pavement. This allows engineers to predict where weaknesses would likely occur after 10,000 miles.

"Then they can change the elements using what-if structures and avoid making mistakes in development," Mitchell said. "It relieves manufacturing of building so many prototype tires."

Information technology, he added, helps keep the company's staff lean "not by actually reducing headcount so much as by giving us increased capacity and more volume without enlarging the workforce."

—L. Goff

At PC manufacturer AST Research in Irvine, Calif., "IS becomes the enabling tool" for cross-functional collaboration, said Chet Lakhani, vice president of information services. Processes within the company are rarely handled by only one department, he said.

Consider the challenge of arriving at a rational price for a new product. "We're in a hostile industry where there is intense pricing competition," Lakhani said. "Prices tend to drop every year, and products must be under constant review." Pricing competitively without undercutting margins requires input on such factors as purchasing costs, inventory positions and engineering. "We have many functions coming together, and the whole business profits from cradle

"IS is a glue across the company that makes new products work."

—Rich Castor

to grave," he said. "There are lots of hand-offs from one department to the next, and IS keeps things from falling through the cracks. So the system design has to look at the whole process."

IS contributes to process management by ensuring the use of identical systems at AST's 15 foreign subsidiaries. This helps keep IS costs below 1 percent of total revenue by reducing development overhead, and enables management to standardize and improve financial controls across the company. As a result, AST is 35 percent ahead of its revenues this time last year, despite falling PC prices.

Microsoft Corp. takes cross-functional operations a step further. The company is centralized to the point that it uses a single network to integrate the workflow of every function. And workflow is itself subject to ongoing revision. Microsoft employs SWAT teams consisting of departmental users and an IS person to rethink business processes before

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initiating any new application-development project or computer-related purchase.

For example, a team dubbed PRPF (purchasing, receiving, payables and fixed assets) reviews the workflow among those four groups for ways to achieve economies of scale and better interaction. According to Neil Evans, Microsoft's general manager for information technology, there are similar reengineering teams for hardware purchasing, software purchasing, supplies and services.

Boeing Corp. may represent the ultimate in centrally integrating diverse business functions. A stand-alone IS division, Boeing Computer Services, keeps an iron hand on interconnect standards, network protocols and the like to manage a worldwide network connecting desktop to desktop and data center to data center.

When it comes to business applications, however, the iron grip relaxes. "We have a lot of control but cooperate with other divisions," said Norm Collins, vice president of the Boeing Support Group within the Computer Services Division. "We have a sharing of views—it isn't a unilateral effort."

Collins's top priority is keeping his group tuned in to the objectives of the product divisions and helping those divisions apply IT to improve their processes. "Tied to that is the requirement of defect-free delivery of applications," he added. "So we have production responsibility and improvement responsibility."

A greater integration challenge involves the worldwide supplier network the company taps in building a large airplane. (For example, some 1,400 internal and external business units are reportedly involved in developing Boeing's new flagship airplane, the 777.) Collins said that although Boeing is a long-stand-

ing user of EDI, it must build more extensive communication links with suppliers to share digital drawings instead of hardcopy blueprints.

"We want to get more sophisticated," Collins said. "We could make things easier for the supplier, shorten cycle times, improve accuracy and later, perhaps, get into con-

current engineering."

Most of our winning companies have only one line of business, allowing IS to zero in on core business applications such as sales, customer service and manufacturing. In the case of retail discounter Mac Frugal's Bargains/Close-Outs Inc. (known until mid-June as Pic 'N'

The Top Large Functional Companies

COMPANY/LOCATION	ANNUAL REVENUES	TOP IS EXECUTIVE	CEO	TYPE OF BUSINESS
AST Research Inc. Irvine, Calif.	\$688 M	Chet Lakhani Vice President/CIO	Safi U. Qureshey Co-Chmn., Pres. & CEO	Personal computers
Apple Computer Inc. Cupertino, Calif.	\$6.3 B	Deborah A. Coleman VP/IS & Technology	John Sculley Chmn., CEO & CTO	Personal computers & networks
Avon Products Inc. New York	\$3.6 B	Raymond Perry VP & CIO	James E. Preston Chmn. & CEO	Personal care products & mail order
Blockbuster Entertainment Corp. Fort Lauderdale, Fla.	\$868 M	Wilbur Smither VP/IS	H. Wayne Huizenga Chmn. & CEO	Video rental stores
Boeing Co., The Seattle	\$29 B	Norm Collins VP/Support Group/ Boeing Computer Svcs.	Frank Shrontz Chmn. & CEO	Aerospace, electronic systems & computer services
Conner Peripherals Inc. San Jose, Calif.	\$1.6 B	Robert Vance Dir./MIS	Finis F. Conner Chmn. & CEO	Disk drives
Cooper Tire & Rubber Co. Findlay, Ohio	\$1 B	John Mitchell Dir./IS	Ivan W. Gorr Chmn. & CEO	Tires & rubber products
Food Lion Inc. Salisbury, N.C.	\$6.4 B	A. Edward Benner Jr. VP/MIS	Tom E. Smith Chmn., Pres. & CEO	Supermarkets
W.W. Grainger Inc. Skokie, Ill.	\$2 B	Ed Bender VP/IS	David W. Grainger Chairman	Industrial equipment distributor
Lands' End Inc. Dodgeville, Wis.	\$682 M	David L. Schlotterback Exec. VP/MIS	Richard C. Anderson CEO	Mail order clothing & accessories
Mac Frugal's Bargains/Close-Outs Inc. Rancho Dominguez, Calif.	\$542 M	Kenneth J. Hite VP/MIS	Leonard S. Williams Pres. & CEO	Close-out merchandise retailer
McDonald's Corp. Oak Brook, Ill.	\$6.6 B	Carl F. Dill VP/Info. Svcs.	Michael R. Quinlan Chmn. & CEO	Fast food restaurants
Microsoft Corp. Redmond, Wash.	\$1.8 B	Nell Evans Gen. Mgr./IT	William H. Gates Chmn. & CEO	Software
Nike Inc. Beaverton, Ore.	\$3 B	Mel Hochhalter VP/Info. Svcs.	Philip H. Knight Chmn. & CEO	Footwear & clothing
Procter & Gamble Co., The Cincinnati	\$27 B	Frank R. Caccamo Div. Mgr./Mgmt. Sys. Div.	Edwin L. Artzt CEO	Food, pharmaceuticals, household & personal care products
U.S. Healthcare Inc. Blue Bell, Pa.	\$1.7 B	Rick Castor VP & CIO	Leonard Abramson Principal Exec. Officer	Health maintenance organization
Wal-Mart Stores Inc. Bentonville, Ark.	\$32.8 B	Bob L. Martin Sr. VP/Data Processing	David D. Glass Pres. & CEO	Department stores
Wm. Wrigley Jr. Co. Chicago	\$1.2 B	Herbert H. Zuegel Dir./MIS	William Wrigley Pres. & CEO	Chewing gum

Save), the core application is inventory management. Mac Frugal's buys out leftover or discontinued merchandise from manufacturers, wholesalers and retailers and resells it to consumers at a discount. (For example, when L'eggs, the hosiery maker, converted from plastic to cardboard packaging, Mac Frugal's bought out the merchandise in its old packaging.)

With warehouses in New Orleans and Rancho Cucamonga, Calif., and some 200,000 pallets of merchandise, losses can mount quickly if inventory is mismanaged. Last year the company upgraded its New Orleans warehouse by implementing bar-code scanning to eliminate errors. Warehouse forklifts are equipped with laser guns wired to radio-frequency terminals that transmit into an IBM AS/400. The data managed by the AS/400 is linked back to a space-management application

on an IBM 4381 at headquarters.

"We've taken our error rate down to near zero," said Kenneth Hite, vice president of MIS. The company plans to further improve inventory management this year by installing new cash registers with POS scanning equipment and dial-in access to the headquarters mainframe. Hite expects the POS system both to reduce inventory shrinkage by correcting errors at the cash register and to improve customer service, thereby raising store volume.

Hite said the cost savings and information value from these new applications will help Mac Frugal's expand in California, the Southwest and Southeast by 40 to 45 stores this year. "We're focused on providing the ... information vehicles to grow the company and at the same time maintain our cost and expense structure at the [current] level."

Avon Products Inc., of New York, also uses IT to grow its business without significantly increasing overhead. Since fewer potential customers are at home during the day, the company expanded into the mail-order business last April to reach a broader base.

Raymond Perry, Avon's vice president and CIO, said the mail-order business, called Avon Select, would not have been possible without the technology to maintain customer lists and process orders. Avon is also investing in new mobile technology for its door-to-door sales force. "In the U.S. we have 500,000 reps going door-to-door and desk-to-desk," Perry said. "It's very difficult to do anything with 500,000 people without using IS. So the majority of [Avon's] business processes are enabled by IS. [IS] becomes the leverage point for the decisions made by the business." ☐

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LARGE PORTFOLIO COMPANIES are composed of distinct business units that have considerable autonomy and share few functions. IS units work closely with their respective businesses to provide localized solutions. Corporate standards and centralized IT priorities don't get in the way.

DIVIDED WE STAND

BY RICHARD PASTORE

One might expect inefficiencies to run rampant at portfolio companies, where every autonomous business unit does its own thing and few resources are shared. But that assumption won't wash with the high-performance 11 that made our list in this category. While autonomy advocates concede that some duplication of effort does occur, they'll insist the benefits of autonomy—entrepreneurial atmosphere, tighter customer focus, rapid response to market changes—overpower the costs of redundancy. Yet these firms are also well aware of the economies to be gained from interdivisional cooperation in such areas as information systems, and they're increasingly willing to put their heads together—as long as they don't have to give up local control. Portfolio firms seem to breed autonomy zealots, such

as Gerry Long, vice president of the IS unit of Roadway Express, the largest subsidiary of trucking company Roadway Services. Without considerable autonomy, Roadway's divisions wouldn't be able to weave IT as tightly into their businesses, and they'd miss out on the exceptional performance that springs from local ownership and accountability, Long insisted. If a corporate IS group were authoring common systems for the Roadway subsidiaries, there would be too many compromises required to address the basic needs of every

division. "All you'd wind up with is an even level of discontent. Nobody would be satisfied," Long said.

Another boon of autonomy is flexibility. "If I leave a system alone after implementation, nine months later my competitor has the same thing," Long said. The flexibility autonomy provides enables rapid system enhancements. For example, Roadway Express's voice-response shipment-tracking system, now three years old, had begun to lose its competitive shine. But Long was able to polish the system with a modification that allows customers not only to inquire about shipment status, but also to place and confirm orders to expedite shipments even after the packages have entered the pipeline. "Adding that component gives us first-in-the-industry capability again," Long said. This quick response might not have been possible if some central IS body was prioritizing the divisions' projects.

Rubbermaid deliberately dispersed IS control to its business units in the early 1980s because "the business units were closer to the customers, and we could respond quickly to changes," said Luke Hoffa, vice president for IS at Home Products, Rubbermaid's largest division. Once IS control moved down to the divisions, the people serving the customers were the same ones managing the IS resources. "I sit on the management team and report directly to the president of the division, so we are able to apply technology to meet our [division-level] business strategies," Hoffa said.

Gillette has also taken steps to augment local autonomy. Although it diminishes his overall control, corporate Vice President of MIS Herbert Moller is pursuing the greater good of autonomy by leading an effort to place IS directors where there were none two years ago. "We are making sure each business unit has a focal point for IS, typically an MIS director," Moller said. He has also lobbied to win seats for these new positions on unit-level

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Genuine Parts Co.
Gillette Co.
Illinois Tool Works Inc.
Johnson & Johnson

Merck & Co. Inc.
Ralston Purina Co.
Roadway Services Inc.
Rochester Telephone Corp.
Rubbermaid

steering committees, giving them access to top management.

Moller sees his own group as a steward and service provider, conducting applied-technology research at the behest of business units and finding ways to optimize shared resources. A recent example of resource-sharing is the corporate decision to award Gillette's international network management to BT Tynet. The move has cut costs and improved line efficiency corporatewide while enhancing such services as EDI at the local level.

Autonomy is not without its price, however. The biggest potential problem is higher IS costs from duplication of effort. But there's also the potential inability to share data and

Portfolio firms seem to breed autonomy zealots.

experiences, and a lack of the critical mass necessary to undertake certain expensive projects.

"Yes, inefficiency is a potential downside," Long conceded. "But those who argue that point are talking about a more efficient way of running IS—not a more efficient way of running the business. A streamlined IT group may not necessarily be serving its customers effectively."

.....

But certainly there are performance benefits to be gained from central coordination, and many portfolio firms are embracing the co-operation concept. For some, this could mean the first steps on an evolutionary path that leads to a new structure, in which shared and autonomous resources are more equally balanced. Rochester Telephone, which began acquiring its 36 subsidiaries just five years ago, is beginning to ponder the performance-enhancement possibilities of common support systems, network and database standards, and information-resource management, said Arthur Maurer, information services director at the company's Rochester Telephone Operations subsidiary.

SNAPSHOT: RUBBERMAID

THE LAISSEZ-FAIRE CIO

The corporate IS department at Rubbermaid consists of IS Director Otto Hammer and, well, that's all. The one-man operation is not surprising for the customer-focused, decentralized Rubbermaid, whose five divisions are responsible for their own operations, IS budgets and virtually all system activities. Even a corporatewide electronic-mail system is operated by a division. So what's left for a CIO to do?

"Most of my time is spent on the road learning about the divisions' best systems so I can transfer them from one division to the others," answered Hammer.

He also chairs a council of divisional IS vice presidents that meets quarterly to set IS standards, solve common problems and determine common architectural directions.

The divisional IS managers look to Hammer primarily as a consultant who provides technical guidance while preserving their freedom. "Corporate allows us enough autonomy to meet the local needs of our customers and operations,"

said Luke Hoffa, vice president for IS at Rubbermaid's Home Products Division. Hoffa also expects Hammer "to coordinate the MIS Council, bring resources and ideas together and act as a catalyst for change."

This arrangement suits both parties. In fact, Hammer shared responsibility for breaking up what used to be a centralized IS operation in the early 1980s. At the time, "IS was the only centralized group within Rubbermaid supporting separate divisional operations," Hammer said. The revised IS plan, with its dispersed control and corporate coordination, better supports the company's decentralized customer focus.

The increased local autonomy paved the way for division-level order-processing and distribution systems that help turn around North American customer orders in less than three days at an order-fulfillment rate better than 96 percent. Corporate coordination, meanwhile, has achieved economies from volume-buying discounts, and more significantly, savings in implementation costs. Cross-division agreements to adopt the same EDI and CAD packages resulted in exponentially lower implementation costs compared with those for multiple packages. Because of these savings, even Rubbermaid's smaller divisions had access to these advanced technologies. Economies also arose when one division became expert in a given function of the CAD package and shared that knowledge with its fellow divisions.

Together these contributions to performance helped Rubbermaid earn accolades as America's second most-admired corporation, according to *Fortune* magazine's 1991 annual survey. Unfortunately for Hammer, if this keeps up he's likely to remain lonely at the top for some time to come.

—R. Pastore



RUBBERMAID is one of America's most-admired corporations, recognized worldwide for its fine home products.

Such cross-divisional IS coordination is often the primary justification for retaining a corporate CIO—for those companies that even bother to have one. It's the corporate CIOs, with their bird's-eye view of the enterprise, who can spot opportunities for cooperation and identify best-of-breed local systems that might benefit other units. These consultant CIOs can also offer advice on the latest IT trends and provide information on new technologies that the units might not have the time or money to investigate.

The CIO as coordinator and consultant is in evidence at Rubbermaid and Genuine Parts. "I have a consulting duty to look over the divisions' shoulders to make sure they're not going off on a tangent," said Tom Braswell, who does double duty as vice president of data processing for Genuine Parts and IS chief for the Automotive Parts Group. As a corporate officer, Braswell has final say on major hardware and software decisions. He also looks for opportunities to exchange IS ideas among the company's three autonomous divisions.

Take Genuine Parts' customer-premise systems. More than 5,000 have been placed at auto-parts stores and their customers' sites—primarily car-repair shops. Along with line-of-business applications such as POS and work-order processing, the systems download parts-inventory levels and price changes nightly, making it easier to order from Genuine than from its competitors. "The stores can sell other companies' parts, but our terminals' ability to download prices and stock information favors us," said Braswell, noting that the system has effectively pushed out the competition at many sites. "We've seen a 30 percent annual increase in business from customers who are tied into us." Braswell has helped spread the concept to Genuine's Office Products Group and

Industrial Parts Group, where it has been replicated under local control.

.....

A few portfolio companies find they can get by without any corporate IS function or central CIO. "If the whole company is marching to the same theme, with the same vision and culture, there's no reason why it couldn't get along without a corporate CIO," said Laurence Chait, director and manager of the information technology planning practice at Arthur D. Little in Cambridge, Mass. The trouble is, not many companies have reached that level of singular purpose, he said.

At CIO-less portfolio companies, the IS manager at the largest business unit sometimes assumes the consulting and coordinating role by default. According to Long, IS managers at Roadway's units look to his IS shop as a resource for ideas

on new technology. Other companies try to spread the chores more evenly among divisional IS managers. Though Rochester Telephone is the largest of the parent firm's subsidiaries, its IS group does not dominate. "We're not the IS focal point for the corporation; we're all equals," Maurer affirmed. In fact, performance would likely suffer if one division's IS group were dominant. The systems experience of an old-guard monopoly carrier would hardly be appropriate for younger subsidiaries in deregulated markets.

So don't talk about the inefficiencies of IS replication or the indispensability of CIOs around the likes of Long, Maurer or Hoffa unless you want a lengthy lecture on the performance virtues of autonomy. Or, if you're lucky, they'll just let their companies' bottom lines make the point. ☐

The Top Large Portfolio Companies

COMPANY/LOCATION	ANNUAL REVENUES	TOP IS EXECUTIVE	CEO	TYPE OF BUSINESS
Eli Lilly & Co. Indianapolis	\$5.7 B	Donald C. Neel Exec. Dir./Corp. IS	Vaughan D. Bryson Pres. & CEO	Pharmaceuticals, medical & agricultural products
General Electric Co. Fairfield, Conn.	\$58 B	Edward J. Skiko VP/IT	John F. Welch Jr. Chmn. & CEO	Diversified manufacturing, technology & services
Genuine Parts Co. Atlanta	\$3.4 B	Tom Braswell VP/Data Processing	Larry L. Prince Chmn. & CEO	Automotive parts distributor
Gillette Co. Boston	\$4.7 B	Herbert W. Moller VP/MIS	Alfred M. Zeien Chmn. & CEO	Consumer products
Illinois Tool Works Inc. Glenview, Ill.	\$2.5 B	N/A	John D. Nichols CEO	Component parts, machinery & chemicals
Johnson & Johnson New Brunswick, N.J.	\$12 B	Ray Giovannelli VP/Ops. & Network Svcs.	Ralph Larsen Chmn. & CEO	Pharmaceuticals & health care products
Merck & Co. Inc. Rahway, N.J.	\$8.6 B	Dr. Charles Popper VP/Computer Resources	P. Roy Vagelos Chmn., Pres. & CEO	Pharmaceuticals & chemicals
Ralston Purina Co. St. Louis	\$7.4 B	N/A	William B. Stirtz Chmn., Pres. & CEO	Cereals, pet foods, baked goods, batteries & lighting products
Roadway Services Inc. Akron, Ohio	\$2.9 B	Gerry Long VP/Summit Information Systems Inc. (IS subsidiary)	Joseph M. Clapp Chmn. & Pres.	Trucking & shipping
Rochester Telephone Corp. Rochester, N.Y.	\$600 M	Joyce Moretti Division VP/Info. and Admin. Svcs.	Ronald L. Bittner Pres. & CEO	Telecommunications
Rubbermaid Wooster, Ohio	\$1.6 B	Otto Hammer Dir./IS	Walter W. Williams Chmn. & CEO	Rubber & plastic products



The man with too many yo-yos.

So you're in charge of info systems for this sprawling operation with hundreds of locations supposedly using PCs to communicate back and forth with HQ (plus a growing gaggle of near-insupportable mobile users), when this "Memo" from some Harvard prodigy with perfect teeth hits your desk with an ominous thud and a casual mandate that info on yesterday's operations be consolidated and delivered to every manager's PC by 8 AM their time (whoa!) using forms-based workflow to and from central site SQL databases, ad hoc query capabilities for mobile PCs, electronic ordering from suppliers, and electronic delivery of text and graphics-based order forms and catalogs to your customers' PCs, and you feel that bad kind of sweat making an executive form of diaper rash around the inside of your collar at the ugly specter of homebrew polling solutions and the agony of long-term support for in-house-developed applications until you remember the RemoteWare proposal from XcelleNet, bingo!, the one specifically designed to tame yo-yo-like networks like yours via communicating applications that use low-cost, occasional connections over all kinds of telecomm facilities and are created and delivered electronically to remote and mobile PCs by operations managers without adding to the programming load of your beleaguered staff or to the slaughter of innocent rain forests, all of which you forward with a thinly-veiled "I'm way ahead of you" to Joe MBA, and that's when you get this amazing call from the biggies on the Board...and they want to make you president or something.

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LARGE COMBINATION COMPANIES are organized into business units that share some functions in order to achieve the cost benefits of centralization. The balance between centralized and decentralized IT services varies with the type of business and is subject to change.

WINNING COMBINATIONS

BY RICHARD PASTORE

Synergy and autonomy—they're the STP treatments that helped 16 high-performance corporate engines capture the flag in our combination category. Combination companies divide themselves into freewheeling business units to gain that entrepreneurial, close-to-the-customer edge, while also keeping one corporate hand on the stick, centrally controlling shared resources for efficiency's sake. The winning CIOs have tuned their IS machines to find the most effective balance between efficient, centrally controlled computing and narrowly targeted, autonomous divisional systems.

Combination companies typically find it cost effective to share more general business functions among their divisions—accounting, payroll and personnel, perhaps some man-

ufacturing or distribution facilities. Many add IS to this mix, sharing at least some centrally controlled systems and reaping performance benefits from economies of scale and resource efficiencies. It's the central CIOs, with their big-picture vantages, who can best find and exploit these opportunities for synergy, said Laurence Chait, director and manager of the information technology and planning practice at the Arthur D. Little Inc. consultancy in Cambridge, Mass. However, Chait warned,

these CIOs must avoid the obstacles of bloated bureaucracies and overextended central resources.

Perennial CIO-100 winner 3M shares a centrally controlled core of systems that ties critical aspects of the business together—CAD systems and management systems for engineering projects, inventory and human resources. These corporatewide systems enable 3M's 60 worldwide divisions to access and swap information among themselves or with headquarters in St. Paul.

Carl Kuhrmeyer, 3M's vice president of administration and de facto CIO, sets corporatewide standards for these common systems and architectures and chairs the steering committee that makes all major IS planning and resource-allocation decisions. Without this central authority, opportunities for synergy would give way to "chaos," he said.

Yet too much central control can stifle the divisions' innovative, entrepreneurial spirit and choke off their contribution to corporate performance. "You have to provide an atmosphere for people to operate in—standards, common architectures—and then let them go," said Kuhrmeyer, who noted that most of 3M's innovative IT efforts begin at the bottom, with the divisions, and bubble up. He sees to it that these best-of-breed systems in areas like manufacturing and sales support are offered to all the divisions as options.

Repeat 100-winner Toys 'R' Us is also careful to avoid smothering local IS initiative. "Efficiency is very important to us, but creativity is more important," said Dennis Healey, vice president of MIS. The nation's number-one toy retailer doesn't mind a little duplication of IS effort and resources in areas like purchase orders and distribution if it leads to a better solution. The firm's young international and children's clothing units possess a creative vigor the corporation sees as integral to their growth. "We have to be careful not to dampen that energy" by

◀ HONOR ROLL ▶

3M	Kelly Services Inc.
Betz Laboratories Inc.	The Limited Inc.
Circus Circus Enterprises Inc.	Marion Merrell Dow Inc.
Coca Cola Co.	May Department Stores Co.
Great Lakes Chemical Corp.	Philip Morris Companies Inc.
H.J. Heinz Co.	Stride Rite Corp.
Harley-Davidson Inc.	Toys 'R' Us Inc.
Jostens Inc.	Walt Disney Co.

pushing down too many centrally authored systems, Healey said.

.....

This tricky balance between shared and autonomous systems most often depends on the degree of business-unit diversity, the prevailing culture and corporate goals. At one extreme are companies such as Circus Circus Enterprises and Kelly Services that favor centrally controlled, common systems in pursuit of consistent corporatewide operations.

For Circus Circus, the goals are

"You have to provide an atmosphere for people to operate in—standards, common architectures—and then let them go."

—Carl Kuhrmeyer

uniform operations and a consistent, family-oriented image at its five casino and hotel properties. Shared resources—including systems—predominate. Systems destined for central control are typically developed and tested at one operating property with heavy local input. "Then we'll retrofit it for the other properties corporatewide," explained John Ginney, corporate MIS director.

Similarly, temporary-help agency Kelly Services relies on considerable central IS control to foster uniformity at its 950 branch offices, according to Harley Ferguson, senior vice president of MIS.

A common customer base also provides opportunities for IS synergy, as it has at footwear manufacturer and retailer Stride Rite. Because its three business units share much of the same customer base, "we were able to build fairly generic, centrally controlled systems to satisfy the requirements of our three marketing divisions," said John Piasecki, vice president of MIS—with a bit of tailoring done where necessary. Originally, the units' autonomous product-design groups were researching computer-aided design individually.

SNAPSHOT: HARLEY-DAVIDSON INC.

HOT WHEELS, COOL HEADS

Sorry, but "Born to be Wild" is not the anthem at Harley-Davidson Inc., at least not in the motorcycle maker's IS circles. Responsibility is more the byword, particularly at the divisional levels. The company shares corporate-controlled financial systems between its two main divisions—motorcycles and recreational vehicle-maker Holiday Rambler Corp.—but other applications and the IS chain of command are separate and autonomous.

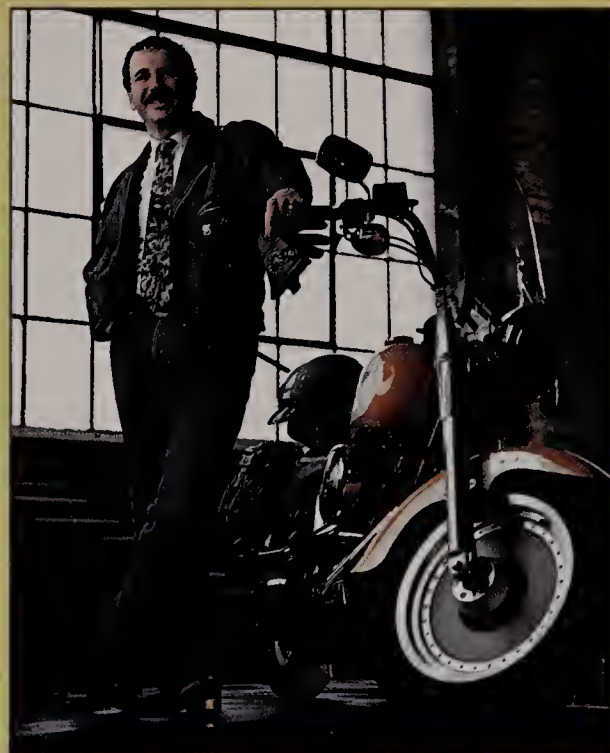
"Having a central IS site would defeat our purposes in pushing information responsibility downward in the organization," explained Director of MIS Richard Kolbe, who heads both corporate and Motorcycle Division systems. Instead, divisional IS groups work together informally when opportunities for synergy arise. "We benchmark against each other; we find out what's been successful for one group and decide if it will work for another," said Kolbe.

Since the Motorcycle Division's IS program is more mature, it can offer Holiday Rambler the benefit of its early technology experience. The younger firm, acquired by Harley in the mid-'80s, has its own insights to offer. "They've been doing a better job in getting their end users to take responsibility for IS projects," Kolbe said. Holiday Rambler also shared its more intimate knowledge of the IBM AS/400 environment when Harley decided to standardize on the minicomputer.

This road has not been without its bumps. "It's a lot easier to misunderstand what the other groups are doing in IS when you don't have one central controlling site," Kolbe said. "We have to do a better job on communication." Kolbe was also surprised by the diverse reactions of divisional personnel toward pushing IS responsibility downward. "Some couldn't wait to take control, but others just didn't want to be involved."

The company's synergies are paying off, with economies of scale from volume-purchase agreements and common disaster-recovery arrangements. Meanwhile, the local autonomy has enabled finely targeted solutions for division-level business problems. For example, Harley's MotorClothing subdivision had been struggling with inventory forecasting—the purchase patterns for clothing were alien to Harley's experience. To solve the problem, the group provided most of the input in selecting a packaged inventory-planning system that boosted forecast accuracy 50 percent and increased inventory turnover an average of 33 percent. With locally controlled systems like this and some interdivisional cooperation, Harley is riding a little easier.

—R. Pastore



KOLBE: "A central IS site would defeat our purposes."

But Piasecki saw that central IS would have a better handle on the technology and transferred the effort to the corporate level. "We have the talent to go out and research CAD, pilot it and then have the units try it," Piasecki explained. "[The business units] aren't technically suited to do that on their own."

Then there's the other extreme: companies where strong individualistic cultures or incompatible divisions dictate more decentralized IS parameters. Basic non-strategic systems like human resources are still centrally controlled, but performance is driven primarily by the divisions' individual IS efforts. At Jostens Inc., a vendor of school photographs, yearbooks and rings, five unit IS chiefs "look to corporate IS for the freedom to focus our efforts on those functions specific to our divisions," said Jim Hoffman, vice president of MIS at the school products group. Exercising his local autonomy, Hoffman spearheaded applications that reduced cycle times and inventory levels, shortening yearbook and ring production deadlines. Corporate Business Systems Manager David Lewis contributes to performance by securing volume-purchase agreements and optimizing shared, non-strategic systems.

.....

The CIO's individual contribution to performance, like that of IS, is shaped by the company's capacity for resource sharing. The CIO role can range from initiator and catalyst to consultant and watchdog. Stride Rite's Piasecki considers himself a catalyst. "When one division comes up with a good idea or a system modification, I'll call all three to the table to discuss it," he said. Though Piasecki initiates some systems, "we find that the units are the best source of information because they're on

the front lines."

At H.J. Heinz, the CIO role is more that of a third-party consultant—literally as well as figuratively. Philip Lichtenfels, former CIO at Westinghouse, was brought aboard four years ago as a contract consultant charged with finding divisional IS synergies. "Facilitating the process is my most important role," said Lichtenfels, who requests that the divisions at least consider using software packages the compa-

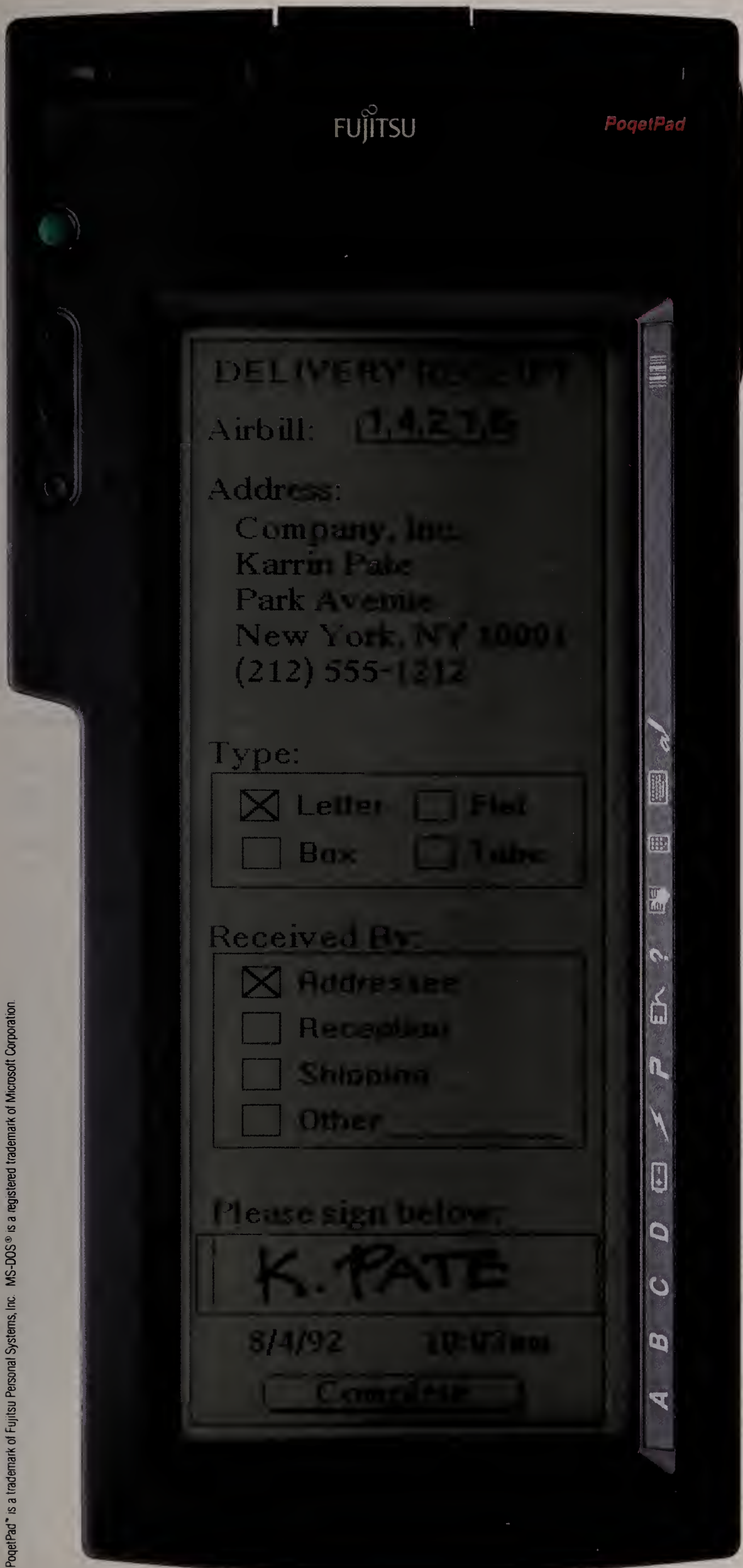
ny already owns. "If they aren't using it, they need to justify why not. That sometimes gets a little testy."

Whatever their individual styles, these IS executives have all helped their organizations reach the performance winners' circle. Yet they will undoubtedly continue tinkering with the mix of centralized and dispersed systems because only the best formula combining synergy and autonomy can keep those checkered flags coming. ☐

The Top Large Combination Companies

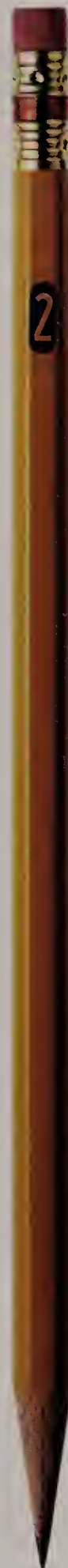
COMPANY/LOCATION	ANNUAL REVENUES	TOP IS EXECUTIVE	CEO	TYPE OF BUSINESS
3M St. Paul, Minn.	\$13 B	Carl A. Kuhrmeyer VP/Admin.	L.D. DeSimone Chmn. & CEO	Adhesives, abrasives, industrial & consumer products
Betz Laboratories Inc. Trevose, Pa.	\$665 M	Wayne Cree Sys. VP; Dir./Corp. IS	John F. McCaughan Chmn. & CEO	Water treatment systems & chemicals
Circus Circus Enterprises Inc. Las Vegas	\$806 M	John Ginney Corp. Dir./MIS	William G. Bennett Chmn. & CEO	Hotel & casino holding company
Coca Cola Co. Atlanta	\$11 B	Hugh K. Switzer VP & Dir./Info. Svcs.	Roberto C. Goizueta Chmn. & CEO	Beverages
Great Lakes Chemical Corp. West Lafayette, Ind.	\$1.3 B	Glenn A. Scuteri Dir./Info. Svcs.	Emerson Kampen Chmn., Pres. & CEO	Specialty chemicals, lubricants & additives
H.J. Heinz Co. Pittsburgh	\$6.6 B	Philip Lichtenfels Sr. Exec. Consultant	Anthony J.F. O'Reilly Chmn., Pres. & CEO	Food & beverages
Harley-Davidson Inc. Milwaukee	\$939 M	Richard Kolbe Dir./MIS	Richard F. Teerlink Pres. & CEO	Motorcycles & RVs
Jostens Inc. Minneapolis	\$860 M	David Lewis Bus. Sys. Mgr. Jim Hoffman VP/MIS, school products div.	H. William Lurton Chmn. & CEO	Photography, yearbooks & rings
Kelly Services Inc. Troy, Mich.	\$1.4 B	Harley R. Ferguson Sr. VP/MIS	Terence E. Adderley Pres. & CEO	Temporary help services
Limited Inc., The Columbus, Ohio	\$5.2 B	N/A	Leslie H. Wexner Chmn. & Pres.	Women's apparel specialty stores
Marion Merrell Dow Inc. Kansas City, Mo.	\$2.8 B	N. Les Clark VP/IS	Fred W. Lyons Jr. Pres. & CEO	Pharmaceuticals
May Department Stores Co. St. Louis	\$10 B	N/A	David C. Farrell Chmn. & CEO	Retail merchandising
Philip Morris Companies Inc. New York	\$56 B	N/A	Michael A. Miles Chmn. & CEO	Cigarettes, food & beverages
Stride Rite Corp. Cambridge, Mass.	\$574 M	John Piasecki VP/MIS	Erwin R. Shames Pres. & CEO	Footwear
Toys 'R' Us Inc. Paramus, N.J.	\$6.1 B	Dennis Healey VP/MIS	Charles Lazarus Chmn. & CEO	Retail toy stores
Walt Disney Co. Burbank, Calif.	\$6.2 B	Sharon D. Garrett VP/Corp. Info. Svcs.	Michael D. Eisner Chmn. & CEO	Entertainment, film & theme parks

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SMALL INDUSTRIAL companies (less than \$500 million) are able to compete with their much larger counterparts by outsourcing nonessential functions and building strategic partnerships. To stay light on their feet, they focus on core competencies and push decision-making out to the front lines.

FANCY FOOTWORK

BY MEGHAN O'LEARY

In order to be a big performer, it is sometimes necessary to act as small and lean as possible. This year's small industrial CIO-100 winners accomplish the work of much larger, diversified companies without taking on their costs by contracting out nonessential functions and forming strategic alliances with more-richly endowed organizations. They focus their attention on core competencies, and their energy on aggressive sales and marketing. Small companies move efficiently and react quickly by giving front-line employees the autonomy they need to do their jobs effectively. They stretch limited technical and human resources to the utmost and stay on top of the details through careful tracking and close communication—both internally and externally.

Whether they focus on spe-

cialized markets (like Cognex Corp., whose computerized systems enable robotic manufacturing machines to "see," and St. Jude Medical Inc., which manufactures heart valves) or provide low-cost commodity items (Cambex Corp. sells IBM-compatible mainframe memory), small industrial firms tend to have centralized manufacturing and administration and far-flung sales offices. Despite their small size, nearly all our winners have international facilities for manufactur-

ing or sales. Most support their nimble operations and efficient communications with lean, flexible networks that, while centralized, offer lots of front-end processing power. Generally speaking, the more high-tech the company, the more important IT is to its success, but the presence of a CIO seems to be tied to the size of the company's bureaucracy rather than to its use of IT.

Most of these companies are reluctant to build large staffs, opting instead to cross-train employees to handle more than one job and to turn support functions over to outside organizations. For some, the decision to outsource stems from a desire to stay focused on the main line of business. Network software maker Novell Inc. outsources manufacturing and disk duplication so that it can concentrate on engineering and adding value to its product.

Other CIO-100 winners outsource costly, labor-intensive functions in order to maximize cash flow and stay alive, especially in cyclical markets. Novellus Systems Inc., a component manufacturer for the semiconductor industry, has avoided cash-flow problems by making 80 percent of its costs variable. It achieves this by outsourcing everything but administration and maintaining only skeleton engineering and R&D staffs, according to Chairman and CEO Robert Graham. Novellus starts projects small and makes decisions quickly to determine market feasibility. Only then does the company contract with outside engineering staff. Under its current system, Novellus's revenues could fall by 50 percent and the company would still break even. Graham estimates that contract R&D lets his company develop products for as little as one-tenth of its nearest competitor's costs.

Exabyte Corp., a maker of computer storage devices, goes beyond mere outsourcing to form strategic manufacturing partnerships with other companies. By partnering with suppliers and OEM customers in develop-

◀ HONOR ROLL ▶

Adobe Systems Inc.
American Power
Conversion
Cabletron Systems Inc.
Cambex Corp.
Cisco Systems
Cognex Corp.
Exabyte Corp.

Novell Inc.
Novellus Systems Inc.
Pentech International Inc.
St. Jude Medical Inc.
Solelectron Corp.
Tseng Labs Inc.
Utah Medical Products Inc.
WD-40 Co.

ment and manufacturing, small companies like Exabyte can achieve the buying and manufacturing economies of scale of much larger organizations. Exabyte's partnership with the Sony Corp.—whose 8mm-tape mechanism is the core of Exabyte's product line—ensures Sony a steady customer and Exabyte high volume and low production costs. This relationship also allowed Exabyte to enter its market with relatively little capital. Another partnership, with Kubota Ltd. of Japan, gives Kubota entree into the computer storage market and Exabyte entree into Japan, as well as free manufacturing and warehousing services in that country.

While these companies stretch and borrow resources readily available to

One of the challenges of being a small company with limited human resources is tracking products that are regulated by law or may need service over many years.

larger companies, they are eager to preserve the sparse management structures that characterize their small size. All but the largest keep management layers to a minimum. Cambex has 23 one-person sales offices across the United States, all reporting directly to a single corporate vice president.

This scarcity of managers makes it both possible and essential to give employees a high degree of autonomy. The central IS department at networking company Cabletron Systems Inc. provides state-of-the-art workstations for its engineering staff but gives them the authority to buy whatever software tools they need to design the products and networks on which the company's reputation has been built. Cambex links its engineers electronically with its larger OEM customers so that they can send software upgrades and take care of problems immediately.

One of the challenges of being a

SNAPSHOT: SOLECTRON CORP.

High-Tech, Grass Roots

The second largest of the small Industrial CIO-100 winners, Solectron Corp. of San Jose, Calif., is determined to remain effective and retain the highly personal, intimate culture of a small company despite its growth. While its size (2,500 employees) and decentralized structure (10 divisions) distinguish it from most of the firms in this category, this printed circuit board manufacturer nonetheless shares many of the qualities that make these organizations successful. It focuses on its core competencies—in this case, defining and cultivating its OEM customer market through strategic partnerships. It believes in empowering employees, through technology as well as training. And it directs its energies and network resources toward creating a communicative corporate culture.

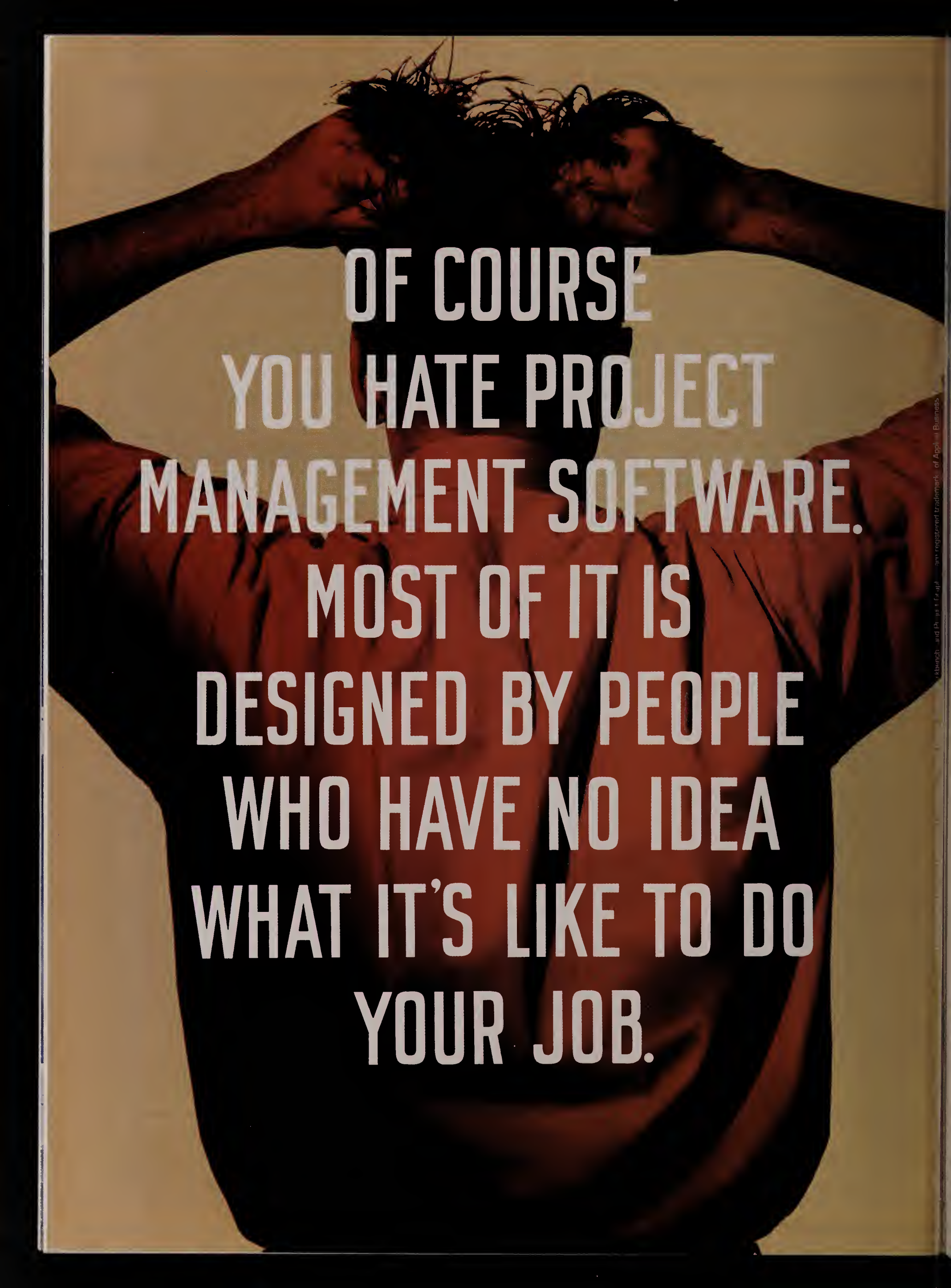
Solectron recently decentralized in order to push decision-making power out to employees and allow them to manage customer relationships more effectively. Each of its 10 divisions is 100 percent responsible for a small group of customers. A 600-PC Novell LAN connects its two San Jose sites and its plant in Malaysia. The network extends to the shop floor and loading docks, collecting data—through bar-code scanning and manual entry—on every one of Solectron's production activities. Division managers and company executives use that data to get a firsthand view of their growing company's daily progress.

Solectron's salespeople have network access to a central procurement database with information about pricing histories, national contracts and price trends, which they can use to negotiate their own deals while personalizing service. This brings continuity to individual customer relationships while giving company management a global view of sales activities. Many of these relationships have developed into strategic manufacturing partnerships, with Solectron gaining greater market penetration for its components and the customer gaining manufacturing capabilities without having to commit capital to facilities and staff.

President Koichi Nishimura believes that in order for his company to benefit from its efforts to behave small, it must cultivate the close relationships between executives and line managers that characterize small companies. For this reason, Solectron's managers and executive officers meet three times weekly to review the success of their quality efforts, relationships with customers and their awareness of what's going on in all parts of the company. "If you're in touch with [people]," Nishimura said, "you're ahead of the game." —M. O'Leary



STEVE NG: IS helps keep the benefits of smallness.

A man with dark hair, wearing a white t-shirt, is shown from the chest up. He has his head buried in his hands, with his fingers spread, suggesting a state of frustration or despair. The background is a solid, light beige color. Overlaid on the image is a large, bold, white text block.

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WHO HAVE NO IDEA
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small company with limited human resources is tracking products that are regulated by law or may need service over many years. Another is gathering the information about customers that enables autonomous employees to build relationships and provide customized, effective service. St. Jude Medical is required by law to track its heart valves through the lifetimes of the individuals in whom they are installed. Each component is assigned a serial number, and the company gathers information about the user from the surgeon who installs it. Exabyte has a bar code and serial number for every component in every storage system it manufactures and tracks its products through the OEM to the final customer for service purposes.

The CIO-100 small industrials are also expert at forging customer relationships. Cambex has had to track down and build a relationship by phone with every IBM mainframe customer in its market in order to survive and grow—this is no small feat, since IBM considers Cambex a competitor. The database of this information is Cambex's most important sales tool, according to Gordon T. Long, senior vice president of field operations. The company is considering selling it to outsiders. St. Jude also bypasses distributors, using the good reputation of its heart valve to appeal directly to surgeons.

In the same vein, the WD-40 Co.'s intense focus on marketing its only product, a petroleum-based lubricant, has given the company name recognition among 90 percent of American consumers and allowed it to carve its niche in dozens of foreign markets.

Effective communication helps keep these ties strong. Soletron Corp., a maker of printed circuit boards, is streamlining its complex

ordering process by allowing OEM customers to order components electronically. By catering to its customers' needs for flexibility, speed and efficient ordering, Soletron hopes to ensure a steady flow of business in a cyclical market.

Most of our winners rely heavily on corporate E-mail and voice mail, both internally and externally. Cognex Chairman Robert J. Shillman takes direct communication one step further: He personally makes the rounds at his company to ask employees whether they have ev-

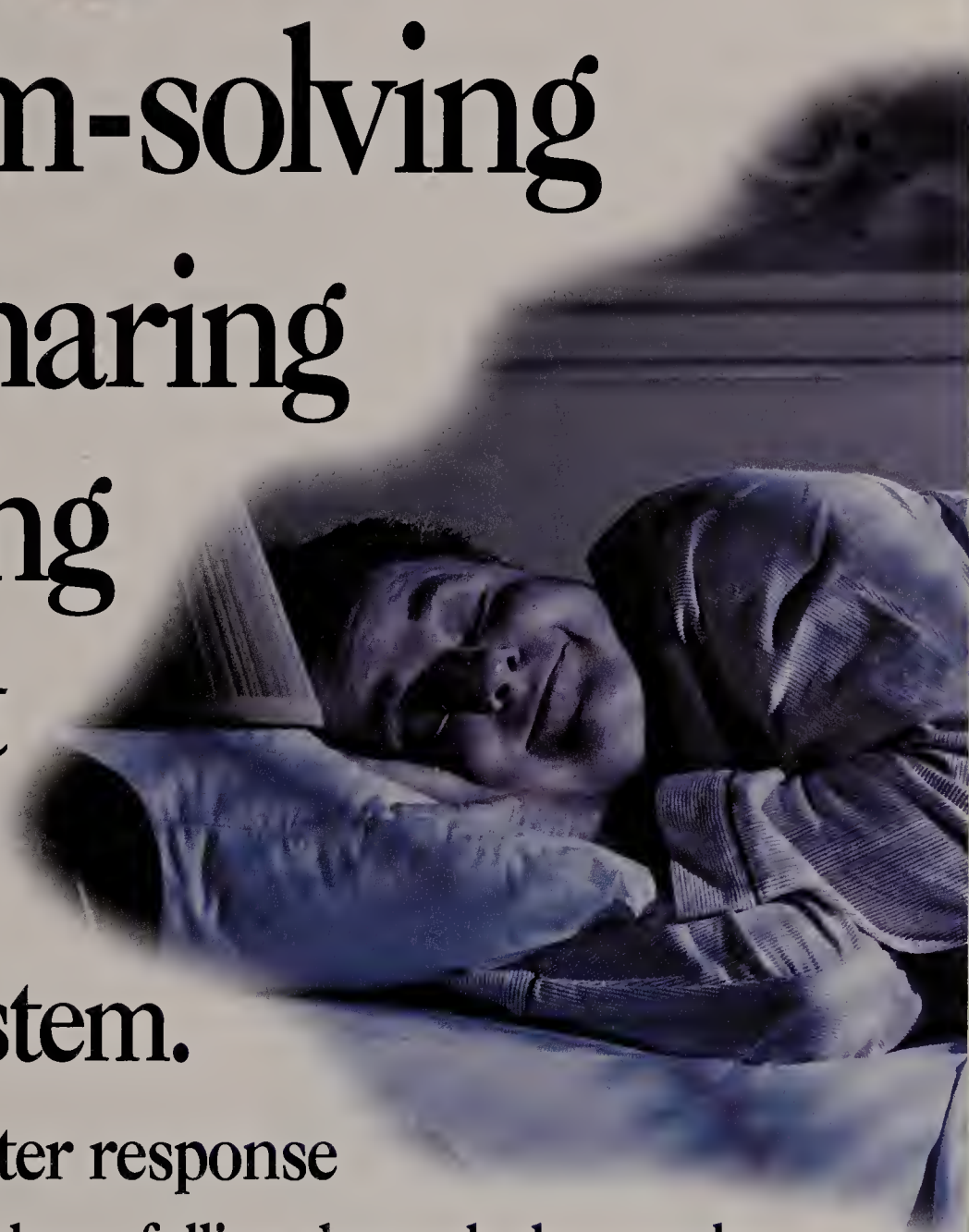
everything they need to do their jobs.

Many small companies place a premium on the ability to build morale by having fun. Shillman said he measures Cognex's effectiveness by the number of employees who show up for work in costume and by the number of parties the company has. With 150 employees worldwide, Cognex is not yet in danger of becoming bogged down in bureaucracy, but it's getting to be more of a challenge to take all the employees to the movies once a month. ☐

The Top Small Industrial Companies

COMPANY/LOCATION	ANNUAL REVENUES	TOP IS EXECUTIVE	CEO	TYPE OF BUSINESS
Adobe Systems Inc. Mountain View, Calif.	\$230 M	N/A	John E. Warnock Chmn. & CEO	Printing & publishing systems software
American Power Conversion W. Kingston, R.I.	\$94 M	Richard Hatch MIS Director	Rodger B. Dowdell Jr. Chmn., Pres. & CEO	Uninterruptible power supplies & software
Cabletron Systems Inc. Rochester, N.H.	\$180 M	Jim McGrady MIS Manager	S. Robert Levine Pres. & CEO	Networking products, systems & services
Cambex Corp. Waltham, Mass.	\$40 M	Gordon T. Long Sr. VP/Field Operations Sheldon M. Schenkler VP/Finance & CFO	Joseph F. Kruy Chmn., Pres. & CEO	IBM-compatible mainframe memory boards
Cisco Systems Menlo Park, Calif.	\$183 M	Doug Allred VP/Customer Advocacy	John P. Morgridge Pres. & CEO	Internetworking products
Cognex Corp. Needham, Mass.	\$31 M	Dr. Robert J. Shillman Chmn., Pres. & CEO	Dr. Robert J. Shillman Chmn., Pres. & CEO	Machine vision systems
Exabyte Corp. Boulder, Colo.	\$234 M	Geoff G. Cooper Dir./MIS William L. Marriner CFO	Peter D. Behrendt Chmn., Pres. & CEO	Computer backup systems
Novell Inc. Provo, Utah	\$187 M	Gordon F. Jones CIO	Raymond J. Noorda Pres. & CEO	Network services & operating systems software
Novellus Systems Inc. San Jose, Calif.	\$80 M	Robert F. Graham Chmn. & CEO	Robert F. Graham Chmn. & CEO	Integrated circuit processing systems
Pentech International Inc. Edison, N.J.	\$34 M	David Melnick Pres., COO & Treasurer	Norman Melnick Chmn. & CEO	Pens, pencils, markers & crayons
St. Jude Medical Inc. St. Paul, Minn.	\$210 M	Steve Wilson CFO	Lawrence A. Lehmkuhl Pres. & CEO	Medical devices
Soletron Corp. San Jose, Calif.	\$265 M	Steve Ng VP/Corp. Materials Mgmt. & MIS	Winston H. Chen Chmn. & CEO	Printed circuit boards
Tseng Labs Inc. Newtown, Pa.	\$61 M	Barbara J. Hawkins Treasurer	Jack Tseng Chmn., Pres. & CEO	Personal computer graphics devices
Utah Medical Products Inc. Midvale, Utah	\$29 M	Wm. Dean Wallace Chmn., Pres. & CEO	Wm. Dean Wallace Chmn., Pres. & CEO	Disposable hospital products
WD-40 Co. San Diego	\$90 M	John S. Barry Chmn. & CEO	John S. Barry Chmn. & CEO	Lubricant & rust-arresting compounds

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SMALL SERVICE companies (less than \$500 million) increase profits by expanding and improving upon their central line of business. Key to their success is the ability to provide consistent service and maintain close customer contact in the midst of rapid growth.

UP-AND-COMERS

BY MEGHAN O'LEARY

High-performance small service companies are not all that different from a neighborhood store, where the proprietor knows customers' names and the brands they prefer and goes to great lengths to make them feel welcome and served.

This year's CIO-100 winners in the small service category focus primarily on expanding or improving their core services in order to boost profits. (The one exception is Otter Tail Power, which, as a regulated, publicly owned utility, has found diversification to be the only way to increase its rate base and improve shareholder return.) They strive to maintain consistent business practices and close customer contact while stretching their resources as far as possible. Much of what is unique to—and successful about—these organizations comes from the emotional investment of

their managers and employees.

IT helps growing small service firms maintain their personalized level of service while making some provision for standardized procedures and centralized reporting. No one is out championing technology at these organizations; rather, IT is regarded as a necessary accompaniment to age and growth. The CIO position is not discussed with any seriousness.

Growth is vital to the survival of small companies in such cutthroat markets as trucking and air transportation, and a passion for focused business activities both encourages

and enables it. For instance, Mesa Airlines' focus on consistent operations is central to the regional carrier's strategy of growth through the acquisition of other small regional airlines. Mesa, which serves the Southwestern United States, makes a rule of acquiring only those companies it believes it can make profitable in 90 days. It does this by running frequent flights with smaller aircraft (resulting in fewer empty seats—a major drain on airline revenues) and employing a small staff, all of whom perform multiple functions (Mesa's pilots also load baggage, and its president has been known to take reservations when things get busy).

Mesa's computerized maintenance-scheduling system allows the airline to detect and prevent potentially costly mechanical problems throughout the fleet. As a result of the effectiveness with which it integrates other carriers into its operations, Mesa was able to increase its revenues by 69 percent in the worst year in the history of air transportation.

Arnold Industries, a transportation holding company, targets already-successful regional trucking companies to help it grow. It also looks for a commitment on the part of these other companies to its own corporate values of service and hard work. Arnold enjoys concrete benefits from its attention to such soft qualities. Its flagship company, New Penn Motor Express, earns 20 cents on the dollar at a time when its larger competitors are only earning a nickel.

Medicine Shoppe International, a St. Louis franchiser of prescription drug stores, is expanding its network of over 800 stores into Canada and Taiwan this year. It chooses its franchisees carefully, looking for the features and service that appeal to its best customers, older women. For instance, Medicine Shoppe stores are usually small, with pharmacy counters at customer level (rather than the somewhat daunting raised counters at many pharmacies) and con-

◀ HONOR ROLL ▶

Arnold Industries Inc.
Duty Free International
Fastenal Co.
FlightSafety International
Inc.
Heartland Express Inc.

Luby's Cafeterias Inc.
Medicine Shoppe International
Inc.
Mesa Airlines Inc.
Offshore Logistics Inc.
Otter Tail Power Co.

venient parking.

Rather than being restrictive, the imposition of consistent corporate procedures and cultures at local levels frees companies to offer considerable local autonomy. While headquarters dictates a list of standard offerings to the 150 Luby's Cafeterias throughout the Southwest and Florida, cafeteria managers are free to choose many menu items based on local preferences. All food is prepared at the individual cafeterias in small batches rather than at the large regional kitchens many cafeteria companies employ to save money and ensure consistent (and often consistently unappetizing) food.

While Luby's cafeterias are owned by the company, managers receive 40 percent of their units' pre-tax

Small service companies learn early how to do "everything with nothing." Those that retain and continue to refine this ability as they grow have an advantage over the competition.

profits as incentive to manage as if they owned the place. POS systems at each location ensure the uniform collection of financial data essential to the public company's reporting procedures.

Small service companies learn early how to do "everything with nothing," according to Richard L. Schuh, MIS manager for Fastenal Co., which sells industrial fasteners. Those that retain and continue to refine this ability as they grow have an advantage over the competition. At the height of a three-year project to install POS systems in Fastenal's 178 previously unautomated retail outlets, Schuh and his staff of four were installing 14 systems a month. Schuh admits this was a stretch, but he believes stretches are integral to his company's success. "Unless you try

SNAPSHOT: OTTER TAIL POWER CO.

HIGH ENERGY

The Otter Tail Power Co., of Fergus Falls, Minn., holds the distinction of being the only diversified small service company among our CIO-100 winners this year. This 85-year-old, \$179 million company's primary business is the generation and transmission of electricity to 450 small, mostly rural communities scattered across 50,000 square miles in Minnesota and the Dakotas.

Like its peers in this category, Otter Tail focuses on improving its core service and staying in touch with its customers as it grows. To this end, it relies on a handful of critical computer applications. A centralized database of customer information allows it to track and anticipate customer demand and answer customers' questions immediately by phone. An automated meter-reading system uses information downloaded nightly from hand-held readers into the company's billing and customer databases, shortening the time between reading and billing. Other systems monitor Otter Tail's miles of power lines, detecting problems before they occur and locating outages immediately.

Unlike our other small service organizations, however, Otter Tail's rate of return is limited by the federal government, based on its physical assets. Nevertheless,

it is accountable to stockholders for maximizing profits. It must also cater to its community's demands for environmentally sound energy solutions.

In order to improve its return without building more plants, the company acquires healthy, non-energy, profit-generating businesses that it does not have to manage—among them a real estate company, a radio station, and a maker of machines to crystallize sugar. In addition, the company is teaching its customers about energy efficiency in order to maximize the use of its facilities and keep rates down. For example, it offers rebates to customers who use energy-conserving light bulbs or insulate their homes.

The sum of Otter Tail's efforts is impressive. The company hasn't filed for a rate increase in 10 years, although its revenues and share value have risen. Its Total Performance Factor—basically the number of kilowatt hours it produces for each dollar invested in its core business (an industry standard measure developed by Doug Kjellerup, Otter Tail's own vice president of planning and development)—has tripled since 1962, even when adjusted for inflation. In addition, the company's support systems have led to a reduction in power outages every year, and its energy production has had less impact on the environment than in the past.

—M. O'Leary



ROD SCHEEL: Support systems help prevent outages.

to achieve the maximum efficiency [regardless of your size], you won't come close to what you possibly can do."

From a systems perspective, this frugality shows up in a reluctance to take the financial risk of investing in advanced technologies and applications. Small service companies devote themselves instead to getting the most out of conservative technological investments. Luby's and Fastenal rely on the most basic of POS systems to track their store activities. Luby's POS isn't even online to the corporate mainframe; daily reports get to headquarters by mail, overnight during closings.

Don Johnson, vice president of management systems for Arnold Industries' New Penn Motor Express, admits that his company's use of IT goes no further than run-of-the-mill dispatching and sales contact-management systems, but he believes that New Penn is unique in its controlled rollouts of systems other companies have proven effective. "We like to come in after everyone else is bloody." New systems are not brought up until employees who will be using them have been thoroughly trained.

New Penn designs and installs systems based on how its people work together. Rather than develop systems for single departments, it develops them with the communication and coordination needs of the whole company in mind. (For instance, a system designed to improve the routing of trucks would address routing's effects on dispatching.) This practice reflects Johnson's career in operations and industrial engineering. "I have absolutely zero computer knowledge and training," he said.

By developing 95 percent of its software in-house, New Penn has been able to create a suite of compatible systems (dispatching, routing, billing, rate-setting and tracking among them), and thus achieve the integration that is standard in

the industry. Johnson attributes much of Arnold Industries' financial success to this integration, which allows the growing company to remain efficient through faster information exchange, closer communication among departments and fewer opportunities for mistakes.

Many of the traits that contribute to small service firms' success are a result of their tendency to promote from within and build a familial corporate culture. Employees are infused with a sense of ownership, a belief that the company's success benefits them personally and is a direct result of their efforts. Executives that have risen through the ranks (New Penn's Johnson is a former dock supervisor; Mesa's president was once its chief mechanic) are more in tune with customer needs and the ins and outs of the business. As a result, they can make more-informed decisions than executives hired from outside. Luby's takes this practice to an ex-

treme: Its current president and chairman were both cafeteria managers at one time. Luby's grooms employees for a good seven or eight years before honoring them with a manager's position; outsiders are never brought in for these posts.

Corporate leaders at these small companies are still very much a part of the team. Titles and reporting structures are deemphasized. "We're just simple truckers," said John Cosaert, Heartland Express's vice president of finance and CFO. "We started this company with 16 trucks operating in 30 states, and we did whatever we had to do to make sure our customers were satisfied." Although the company has over 600 trucks now, Cosaert believes that the teamwork and attention to service it retains from those days are its greatest assets.

When people talk about effectiveness in organizations, he said, "all they're trying to do is create a 16-truck mentality." ☐

The Top Small Service Companies

COMPANY/LOCATION	ANNUAL REVENUES	TOP IS EXECUTIVE	CEO	TYPE OF BUSINESS
Arnold Industries Inc. Lebanon, Pa.	\$164 M	Don Johnson VP/Mgmt. Sys. New Penn Motor Express	E.H. Arnold Chmn., Pres. & Dir.	Trucking
Duty Free International Ridgefield, Conn.	\$105 M	Gerald F. Egan VP/Fin. & CFO Lyn Kelly Dir./IS	John A. Couri Pres. & CEO	Duty free stores
Fastenal Co. Winona, Minn.	\$62 M	Richard L. Schuh MIS Manager	Robert A. Kierlin Chmn. & Pres.	Fasteners, industrial & construction products
FlightSafety International Inc. Flushing, N.Y.	\$267 M	Kenneth Motschwiller VP & Treasurer Jim Waugh VP/Marketing	Albert L. Ueltschi Chmn. & Pres.	High-technology training
Heartland Express Inc. Iowa City, Iowa	\$74 M	John Cosaert VP/Finance & CFO	Russell A. Gerdin Chmn., Pres. & CEO	Freight transportation
Luby's Cafeterias Inc. San Antonio, Texas	\$328 M	John G. Curtis Jr. Sr. VP & CFO	Ralph Erben Pres. & CEO	Cafeterias
Medicine Shoppe International Inc. St. Louis	\$37 M	John Loseke Dir./Info. Svcs.	David A. Abrahamson Pres. & CEO	Retail pharmacies
Mesa Airlines Inc. Farmington, N.M.	\$78 M	Larry L. Risley Pres. & CEO	Larry L. Risley Pres. & CEO	Regional airlines
Offshore Logistics Inc. Lafayette, La.	\$95 M	George M. Small CFO	James B. Clement Pres. & CEO	Aviation transportation services
Otter Tail Power Co. Fergus Falls, Minn.	\$179 M	Rod Scheel Dir./Info. Svcs.	John McFarlane Pres. & CEO	Electric utility

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FINANCIAL SERVICES COMPANIES are a diverse lot, ranging from banks to insurers to tax preparers and brokerage firms. They compete today in a daunting economic climate, but the top performers show an ability to surmount hard times by focusing on core businesses, customer-centric values and rigorous cost-control.

BANKING ON THE BASICS

BY KATHLEEN MELYMUKA

For the past few years, hanging on by your fingernails has been considered a respectable performance in financial services. But the 15 firms that made it into this year's CIO-100 are sailing through the recession with a combination of old-fashioned principles and new-age technology applied in a highly focused way. Their performance has been particularly impressive against the backdrop of a financial-services environment shaken by overcapacity, excessive competition and imprudent risks.

The overall financial picture has finally begun to improve. Mergers are sopping up some of the overcapacity, and capital and reserves among the largest banking companies have been slowly growing. The lowest in-

terest rates in 20 years have allowed banks and thrifts to aggressively lower the rates they pay on deposits, thus shoring up profits.

But the roots of recovery have not yet taken hold. The anticipated borrowing boom never materialized, as beleaguered consumers and businesses worked to pay off old loans rather than take out new ones, and the shock of interest rates below 5 percent sent many CD holders looking for higher yields.

Loan policies tightened up, but that horse had already left the barn, and high unemployment and declining real estate values guaranteed that defaults would continue. "On the surface, things are improving in the finance business," said George M. Bollenbacher, senior industry consultant for the finance industry at IBM and author of *The New Business of Banking*. "The problem is that another hiccup will make it look terrible again."

Despite the turmoil, high-performance financial-services firms have managed to post impressive numbers. The five-year average return on equity for some of this year's winners blows away the average ROE of their respective industry sectors. GEICO: 26.9 versus 15.0; Marsh & McLennan: 38.9 versus 20.5; Morgan Stanley: 27.5 versus 10.5; Golden West Financial: 19.7 versus 0.7 (that's not a typo).

They've done it by sticking to basics in an industry that's been distracted by tangential business ventures. They have distinct and powerful corporate personalities and provide a personal touch when dealing with customers. Each concentrates on doing one thing well, having resisted the temptation to overextend. Instead they have concentrated on knowing their customers and pinching their pennies. The only newfangled element in their success is the liberal and imaginative use of technology, applied with a laser focus.

"Companies have a personality, a character, like people," said Diogo Teixeira, a partner in the Center for Information Technology and Strategy at Ernst & Young in Boston. "Some are more distinctive than others." Morgan Stanley Group, for example, has a culture as distinct as a New England prep school. Its clients are blue chip; its people, blue bloods. "It's very old-school."

The strength of Morgan Stanley has been its ability to cultivate strong, highly personal relation-

◀ HONOR ROLL ▶

20th Century Industries
Banc One Corp.
Bancorp Hawaii Inc.
Fifth Third Bancorp
GEICO Corp.
Golden West Financial Corp.
H & R Block Inc.
Marsh & McLennan Companies

Morgan Stanley Group Inc.
State Street Boston Corp.
Synovus Financial Corp.
USAA
Wachovia Corp.
Wells Fargo & Co.
Wilmington Trust

ships with major clients over a long period of time. During the '80s, many investment bankers moved from firm to firm like bees among flowers, doing lots of deals but building little or no loyalty. Morgan Stanley resisted the temptation to buzz after the quick buck and continued to work primarily with long-established clients.

USAA is another distinct personality, with the strongest military flavor west of the Pentagon. Founded by army officers and headed by a general, USAA is a privately owned, not-for-profit membership organization insuring active-duty or retired military officers and their families. Its annual report is replete with Norman Rockwell reproductions, it hasn't laid off an employee since its found-

Synovus is determined to achieve its economies of scale so that they go unnoticed by local customers, preserving what customers value in each local bank's way of doing things.

ing in 1922 (its turnover rate is half the industry average), and its officers quote FDR copiously.

But the *Our Town* image doesn't extend to technology. USAA uses IT in direct pursuit of better customer service. Scanning technology and what USAA proudly claims is the world's most extensive imaging system have virtually done away with paper. Telephone service reps, who handle 95 percent of the company's business, have the complete electronic files of USAA's 2.2 million customers at their fingertips.

USAA uses this infrastructure to project a down-home image. "When [customers] call, we'll be able to look through their records as if we were there at their kitchen table," explained George McCall, vice president of corporate and support systems.

Customers appreciate it. USAA ranks first in its industry in the per-

SNAPSHOT: GEICO CORP.

ITS SUCCESS IS NO ACCIDENT

When times get tough, property and casualty policyholders shop around for a better deal. That bodes well for GEICO Corp., which offers among the lowest insurance rates in the industry. Despite its low rates, GEICO makes money on premiums, a feat almost unheard of in the property and casualty industry. While insurers lost an average nine cents on every dollar of premium they brought in last year, GEICO made 3.5 cents. The five-year median return on equity for the property and casualty industry was 15.0 percent; GEICO's was 26.9 percent.

How do they do it? GEICO Corp.'s largest subsidiary, Government Employees Insurance Co., writes preferred-risk auto insurance, primarily for government employees and military personnel. It targets good drivers and gives them what they most want: good rates and responsive service.

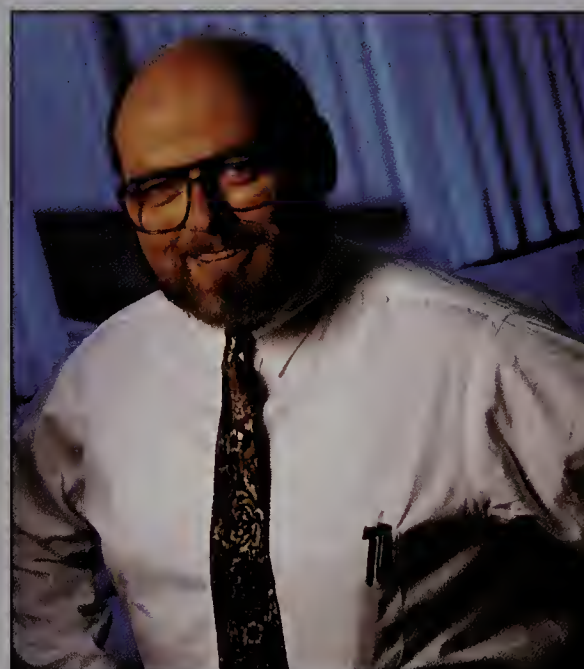
"A good customer is someone who represents a good risk at the price being charged," said William I. Ledman, vice president of systems and data processing. "We must give a very competitive price, because it's a very competitive market."

Stringent cost control helps. GEICO's primary customer base of safe drivers is crucial to keeping costs down. Also, GEICO sells directly to customers, cutting out agents and the 15 percent commissions they normally get. Other cost-control mechanisms include the use of medical reviews, select repair shops to reduce fraud, outside bureaus to check for prior claims, inspections of insured cars for prior damage, and investigative teams that seek out fraud.

Low costs attract customers; good service keeps them. That's where information technology makes the difference. GEICO's phone lines are staffed 24 hours a day by representatives who have immediate electronic access to all customer records. When a claimant calls, a phone rep records the loss report, confirms coverage and sets up an appointment with the nearest adjuster. The system forwards the records immediately to the adjuster, who downloads pertinent data into a hand-held computer. The adjuster then examines the car, records the damage on the hand-held, calculates the claim and cuts a check on the spot.

GEICO monitors its service carefully, surveying every claimant after each claim is settled as well as a large sampling of policyholders every year. It also recently embarked on a total quality program. "We're reexamining how we do things," said Ledman. "We are looking very hard now at employing new techniques and new systems technology to business practices. The issue is how much reengineering has to be done to business processes to make the best use of technology."

-K. Melymuka



LEDMAN: "A good customer is a good risk."

Our motto.



After all these years, we

Before we were known for computers or Nobel prizes or a blue logo, IBM stood for service. And we still do.

But today the need for service is different. Information technology has become so essential (and so complex), many companies feel it has taken them over. They're looking for someone to lighten the load so they can focus on what matters most, running their business.

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centage of policies—99.8—that remain active over a period of time.

Sticking to basics is also characteristic of Synovus Financial Corp. Having made its name in community banking, Synovus focuses on middle market risks such as auto and home loans and shies away from large, risky loan transactions. Synovus credits its success to its staff's strong community ties. A small-town bank acquired by Synovus retains its name, employees, officers and board of directors.

The community orientation even colors Synovus's use of technology. Despite a massive effort to centralize back-room data processing for all of its 26 banks, Synovus is determined to achieve its economies of scale so that they preserve what customers value in each local bank's way of doing things.

Golden West Financial has weathered the S&L storm by adhering to the Golden Rule of S&Ls: Take in deposits and give out residential mortgages, period. Golden West fleshes this out with a few corollary principles: A bank should be well capitalized; customers should have a stake in their loans (the average down payment for a Golden West mortgage is a whopping 29 percent); pennies should be pinched (general administrative expenses are about half the industry average); technology should be used thoughtfully (Golden West, while committed to IT, has no ATMs because its customers, whose average age is 58, are intimidated by them).

By now it should be clear that what separates the financial services winners from the also-rans is focus. And nobody focuses like H&R Block. Its simple charter is to provide low-cost tax services. Keeping things that basic has enabled H&R Block to increase revenues every year since its founding in 1955 and increase earnings in all

but one of those years.

Block is currently using technology to offer its customers a new service while enhancing its leadership in the field. Using its CompuServe subsidiary as a conduit, the company filed more than 5 million tax returns electronically in 1991, accounting for 67.1 percent of total individual income tax returns filed electronically and amassing electronic filing fees of \$151.9 million.

This year's winning companies demonstrate that in business, as in politics, organizations that try to be

all things to all people come out behind. "Mice and elephants are both herbivores, but they don't compete because they feed off different levels in the jungle," said Michael Sicilian, vice president and CIO at Seabury & Smith, a subsidiary of Marsh & McLennan Companies. "We have to see our ecological niche and optimize that."

Those that stick with the basics that ecology dictates—know yourself, know your customers, keep it personal, do the core things well—are ultimately winners. 

The Top Financial Services Companies

COMPANY/LOCATION	ANNUAL REVENUES	TOP IS EXECUTIVE	CEO	TYPE OF BUSINESS
20th Century Industries Woodland Hills, Calif.	\$906 M	Bill Dailey VP/Info. Svcs.	Louis W. Foster Chmn. & CEO	Insurance
Banc One Corp. Columbus, Ohio	\$529 M (Net income)	David Van Lear Pres. & CEO/Banc One Service Corp.	John B. McCoy Chmn. & CEO	Bank holding company
Bancorp Hawali Inc. Honolulu	\$112 M (Net income)	James R. Massey Sr. VP	H. Howard Stephenson Chmn. & CEO	Bank holding company
Fifth Third Bancorp Cincinnati	\$138 M (Net income)	George W. Landry CIO & Dir./DP & Purch.	George A. Schaefer Jr. Pres. & CEO	Bank holding company
GEICO Corp. Washington D.C.	\$1.8 B (Premiums)	William Ledman VP/Sys. & DP	Olza M. Nicely Pres. & CEO	Insurance
Golden West Financial Corp. Oakland, Calif.	\$238 M (Net income)	Theodore Tomblinson Group Sr. VP & Dir./IS	Herbert M. Sandler Chmn. & CEO	Savings & loan
H&R Block Inc. Kansas City, Mo.	\$1.2 B	Judy Keisling Asst. VP, Dir./Tax Training & Automated Systems	Henry W. Bloch Chmn. & CEO	Tax services
Marsh & McLennan Cos. New York	\$2.7 B	Michael Sicilian VP & CIO/Seabury & Smith	Frank J. Tasco Chairman	Insurance, investment management & consulting
Morgan Stanley Group Inc. New York	\$2.8 B	Gary T. Goehrke Managing Dir.	Richard B. Fisher Chairman	Investment banking
State Street Boston Corp. Boston	\$139 M (Net income)	David J. Sexton Sr. VP/IT	Marshall Carter Pres. & CEO	Bank holding company
Synovus Financial Corp. Columbus, Ga.	\$40 M (Net income)	Steve Brice Pres./Synovus Data Corp.	James H. Blanchard Chairman	Bank holding company
USAA San Antonio, Texas	\$4.8 B	Donald Lasher Pres./Info. Svcs. Div.	Robert F. McDermott Chmn. & CEO	Insurance & banking
Wachovia Corp. Atlanta & Winston-Salem, N.C.	\$229 M (Net income)	Walter E. Leonard Jr. Exec. VP/Ops. Svcs.	John G. Medlin Jr. Chmn., Pres. & CEO	Bank holding company
Wells Fargo & Co. San Francisco	\$21 M (Net income)	N/A	Carl E. Reichardt Chmn. & CEO	Banking & financial services
Wilmington Trust Co. Wilmington, Del.	\$72 M (Net income)	John Kipp Sr. VP	Leonard Quill Chmn. & CEO	Bank holding company



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GOVERNMENT serves the interests of citizens rather than customers and stockholders. But the state and local bodies included here use technology in many of the same ways as for-profit organizations: to track performance, deliver information and create new services.

THE PEOPLE'S CHOICE

BY ALLAN E. ALTER

We have some good news and some bad news for a disgruntled electorate. The good news: High-performance government isn't necessarily an oxymoron. Some state and local governments efficiently and effectively deliver services to their constituents, and 15 won enough votes from our judges to make the high-performance CIO-100. The bad news: the Bush administration and candidate Bill Clinton's state of Arkansas didn't even come close. (Only one federal agency won even two votes; Arkansas fared poorly in the balloting as well.)

What have our winners got that the Bush and Clinton administrations haven't got? Some states, like Minnesota and Wisconsin, boast a tradition of progressive government; others, such as Utah, are models of fiscal prudence. We found that most of the local winners employ a

council-manager form of government: Elected officials are limited to setting goals and approving budgets, leaving professional administrators free to run the day-to-day operations with minimal interference from politicians.

But a strong political culture and professional management aren't all that make these governments winners. They also rely on technology to maintain tight fiscal controls. Quarterly fiscal reports are passé—Tennessee closes its books monthly; Port-

land, Ore., and Wisconsin are setting up systems that provide online, real-time financial-status reports.

Most high-performance governments use integrated financial systems. Tennessee has integrated its departmental financial systems into one, while all of Utah's agencies use a single accounting system. Integration makes possible programs such as Utah's Gotcha Program, which saves millions by withholding tax refunds and entitlements from people who owe money to the state. And Utah, Sunnyvale, Calif., Portland and Los Angeles County have systems that project financial and demographic trends affecting the economic future of the government.

Some city governments track performance and benchmark against other governments and private companies, then use the information to improve their internal processes and offer better services. Probably no one is further along this curve than Sunnyvale.

Sunnyvale's government sets measurable goals that focus on performance, not expenditures. (The librarian, for instance, measures performance not by how many books the city buys, but by how often visitors find the material they want.) It creates budgets by estimating the cost of attaining a certain performance level and deciding what level it is willing to pay for (for example, is a 90 percent instead of a 75 percent library find-rate worth the extra cost?). Performance and expenditures are diligently tracked on a Hewlett-Packard minicomputer. Everything is measured—Sunnyvale has even surveyed motorists who have received citations on how they were treated by the police. The result: efficiency, financial stability and measurable effectiveness. Can you name another municipality where the cost of city services decreased 20 percent between 1985 and 1990?

.....

Though Sunnyvale's methodical and exhaustive approach to measuring performance is

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Dade County, Fla.
Dallas
Indianapolis
Iowa
Los Angeles County,
Calif.
Minnesota
Phoenix

Portland, Ore.
Seattle
Sunnyvale, Calif.
Tennessee
Utah
Virginia
Washington State
Wisconsin

unique among our winners, the 14 other governments are also changing and streamlining their internal processes through innovative applications that improve service and save money simultaneously.

One common approach is to offer one-stop shopping for government services. Tennessee's Department of Human Services has created an integrated public-assistance system that enables officials to determine eligibility, set benefit amounts, issue aid

Many of our winners have established two CIO posts—one for planning and policy, another for operations and implementation.

and correct problems for numerous programs on the spot. Taxpayers benefit too: Efficiencies created by the system are expected to save Tennessee \$24 million in fiscal 1993.

Another trend is self-service government: cutting staff levels by enabling citizens to deal with their governments electronically. Contractors can submit building-inspection requests through a voice-response system in Dallas, and by fax in Phoenix. Dade County, Fla., provides 200 companies with online access to its databases for a fee; in the future, builders will be able to schedule inspections and apply for permits electronically. And in Los Angeles County, fines can be paid by credit card or check at an electronic kiosk outside the Long Beach courthouse.

That's just the beginning. The county is participating in INFO California, a network of kiosks that will allow citizens to get information and conduct transactions with their governments electronically. People who lost homes, businesses and property in the Los Angeles riots are receiving a preview: The county has established disaster-assistance centers with electronic kiosks that provide information on various aid programs in English, Spanish and Korean.

SNAPSHOT: PHOENIX, ARIZONA

CAPITOL VENTURES

Phoenix, our top vote-getter among governments, is something of a showcase for innovative technology. In Phoenix, firefighters and ambulance drivers rushing to a burning building can receive information about its structure and layout on their mobile data terminals. Officials can have documents called up from the city clerk's imaging system and sent to them by electronic mail. Builders and businesspeople who need information, assistance, permits or licenses can get everything they require from the development services department, which is networked to the rest of the city government. And the city is currently piloting a geographical information system; the system's "demonstration mile" combines data on all buildings and structures along one mile of roadway.

But IS's biggest contribution to making Phoenix a high-performance government may be its focus on redesigning business processes, according to Joe Motto, the city's director of information technology management, and Laraine Rodgers, its newly hired MIS director. (Motto recently divided MIS into operational and planning departments so he could focus more on coordinating technology. This is an important issue in a decentralized government that increasingly shares information across departments while empowering them to take initiatives, including technological ones.)

"It is the IT function here that is pushing a structured approach to business reengineering," said Motto. He has urged the IS advisory council, chaired by the assistant city manager, not to fund new IT projects unless a business analysis of current processes is conducted.

Motto is dovetailing reengineering with the city's approach to privatization and financial management. Phoenix's finance department tracks expenses through an automated chargeback system operated by IS. This system measures the cost of all city services. When the chargeback system indicates private companies could provide a service at lower cost, the city issues an RFP.

IS helps departments prevent privatization, or regain the city's business, by aiding them in improving their business processes. The city privatized about 40 percent of its trash collection in 1980; four years later, IS helped the sanitation department regain that business by identifying operating costs, helping it to save money. The water services department turned to IS with problems collecting on delinquent accounts. IS's solution: Create a computer link between water services and the finance department's collection specialists and let them do the work. The city's revenues are up by \$13 million, and the water services department was spared the trauma of privatization.

—A. E. Alter



MOTTO and RODGERS: Redesigning business processes is IS's greatest contribution.

Technology is also helping police, fire and ambulance services get timely information to the front lines. Most winning local governments have provided their police forces with mobile data terminals; in Dallas and Phoenix, ambulance drivers and firefighters have them too. The Dallas police have integrated their terminals with the 911 system, the criminal records database and motor-vehicle registry files, allowing patrol officers to conduct computer inquiries and enter data from the field. Detectives have desktop access to the same data, as well as to an imaging system that stores police documents. Dallas also has a separate imaging system for fingerprints. As a result, the police have doubled the number of suspect, missing-vehicle and stolen-property reports they investigate each day, and the burglary rate has been cut 22 percent in three years.

Videoconferencing is also proving to be a money- and time-saver for governments. Court officials in Dade County need no longer brave traffic to conduct business. Instead, witnesses can give depositions from videoconferencing rooms in the county's two main administrative buildings. Utah parole boards are piloting the technology by holding video parole hearings with convicts around the state. And Utah officials plan to put videoconferencing equipment in rural high schools so isolated students can study foreign languages with teachers in urban centers.

.....

Besides their ability to provide innovative applications, our winners' IS organizations have three other traits in common. First, they have built technology platforms that cross departmental lines, allowing officials to pool information and make more informed decisions. Without networking, shared or central databases and common financial systems, many of these governments' most important applications couldn't exist. For example, most are investigating or investing in geographical information systems (GISs)—computing environments that combine

information from many sources, organize it by location and turn it into easy-to-understand maps. Wisconsin, for instance, uses a GIS augmented by a library of photographs stored in an imaging system to track accidents and the physical conditions of its highways.

Second, IS management is plugged into the mainstream of governmental decision-making. Many of our winners have established two CIO posts—one for planning and policy, another for operations and implementation. The CIO, or the CIO-for-planning, often receives guidance from an advisory board of senior officials. Tennessee's Information Systems Council includes the senate majority leader, the commissioner of finance and administration, and two private-sector CIOs. L.A. County has two such advisory boards: one for the justice system, another for human and administrative services.

Third, IS participates in the same efficiency-forcing efforts as the rest of government. Dallas's IS department has competed against bids from outsiders five times and privatized its telephone service. (Southwestern Bell now owns the city's telephones and switches.) Dallas compares its chargeback fees against private companies and benchmarks itself against other governments. The result, ac-

cording to Dallas Director of Information Services David J. Morgan, is that the city's IS budget has held steady despite a 15 percent growth in demand for services, head count is down from 210 to 185, and its current charge-per-transaction rate is less than half that of nine years ago—a performance even Ross Perot would admire. ☐

The Top Governments

GOVERNMENT/LOCATION	TOP IS EXECUTIVE	TOP ADMINISTRATIVE OFFICIAL
Dade County, Fla. Miami	Manny Garcia Dir./Office of Computer Svcs. & IS	Joaquin Avino County Manager
Dallas	David J. Morgan Dir./Info. Svcs.	Jan Hart City Manager
Indianapolis	John Cox Dir./IS Agency	Stephen Goldsmith Mayor
Iowa Des Moines	Dale Nelson Admin./IS Div.	Terry Branstad Governor
Los Angeles County, Calif. Los Angeles	Michael J. Henry Asst. Admin. Officer	Richard B. Dixon Chief Administrative Officer
Minnesota St. Paul	Bernie Conlin Asst. Commissioner, Inter technologies Group/Dept. of Admin. Steve Gammon Asst. Commissioner/ Information Policy Office	Arne H. Carlson Governor
Phoenix	Joe Motto Dir./IT Mgmt. Laraine Rodgers Dir./MIS	Frank Fairbanks City Manager
Portland, Ore.	Steve Bauer Dir./Office of Fin. & Admin.	Bud Clark Mayor
Seattle	Leonard Roberts Dir./Data Processing	Norman Rice Mayor
Sunnyvale, Calif.	Beverley J. Simmons Dir./Libraries & Info. Mgmt. Svcs.	Thomas L. Lewcock City Manager
Tennessee Nashville	Bradley Dugger Chief/IS	Ned McWherter Governor
Utah Salt Lake City	G. Steven Grimshaw Dir./Div. of IT Svcs. Harold D. Carpenter State IT Coordinator	Norman H. Bangerter Governor
Virginia Richmond	J. Westwood Smithers Jr. Dir./Dept. of IT	L. Douglas Wilder Governor
Washington State Olympia	Brad Blancard Dir./IS	Booth Gardner Governor
Wisconsin Madison	Neal Steinhoff Admin./IT Svcs.	Tommy Thompson Governor

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BEHIND THE SCENES

Putting together this year's CIO-100 was a complex process of defining, categorizing and winnowing. Fortunately, we had no shortage of expert help.

MAKING A LIST

Companies appearing in the ranks of this year's CIO-100 were selected in a three-stage process. First, with the aid of several advisers, we assembled a list of nine performance measures. They are as follows: return on (common) equity (ROE), both latest fiscal year and five-year average; revenues, both latest fiscal year and five-year average growth; revenue-per-employee; ratio of selling, general and administrative costs to sales; return on net assets (RONA—earnings before interest and taxes divided by total assets); days in receivable (averaged by five quarters); and the ratio of long-term debt to common equity. For service companies, we looked at operating profit margins (operating profit before interest and taxes divided by sales) instead of RONA, and the ratio of administrative expenses to overall expenses instead of inventory turns.

Employing its own industry-selected groupings rather than SIC codes, Zacks Investment Research Co. of Chicago ran the following lists for us: Large industrial companies (revenues greater than \$500 million and more than 2,000 employees), small industrial companies

(revenues less than \$500 million), and heavy industrial companies. Selections were culled and ranked by a weighted combination of ROE, RONA and revenue-per-employee figures. Zacks also ran lists for large and small service companies, using the same revenue and employee cut-offs (culled and ranked by a weighted combination of ROE, gross margins and revenue-per-employee figures), and large and small electric utilities. Because of restrictions on reporting figures, utility companies were selected and ranked by ROE, operating income less depreciation, and revenue-per-employee.

Zacks also generated separate lists of banks and non-bank financial-service companies. Because of inconsistencies in reporting figures, measures for these companies were ROE (latest fiscal year and five-year average), latest sales/revenue figures and five-year averages (for banks, that is interest income plus non-interest income), pre-tax income to revenues (pre-tax income plus interest expense divided by net sales), and debt-to-equity ratios. The se-

lections were culled and ranked by five-year average ROE.

CIO then reviewed detailed financial reports on the nearly 400 companies named in the nine lists. We dropped eccentric selections, such as companies with negative equity or very high debt-to-equity ratios. Large companies (except for financial-service companies) were interviewed to assess their organizational design, based upon the A.T. Kearney benchmarking categories (see "The Shape of Excellence," Page 26). The companies were then regrouped into the categories highlighted in this year's CIO-100 issue, and the top-ranked companies in each category were selected as semifinalists—over 170 companies in all. (In addition, judges nominated and chose all high-performance government winners.)

Finally, the financial-measurement figures gathered on the semifinalists were sent to judges (see list below), along with financial information and selected business articles about the companies. The judges reviewed the lists and made their selections. Because the performance measures for banks and non-financial service companies were not as exacting as for manufacturers, we encouraged judges to apply other performance benchmarks to their decisions. CIO tabulated the responses, and ties were broken in consultation with judges.

MEET THE JUDGES

Industrial and Service Companies

George Abbott
President, Troubleshooters Inc.
Omaha, Neb.
Immediate past president, National Small Business United

Bob Borsch
Midwest regional director, Coopers & Lybrand
Chicago

Stephen Coit
General Partner,

Merrill Picard
Anderson & Eyre
Waltham, Mass.

Thomas A. Gray
Retired chief economist,
U.S. Small Business
Administration
Washington

Robert W. Hall
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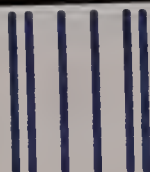
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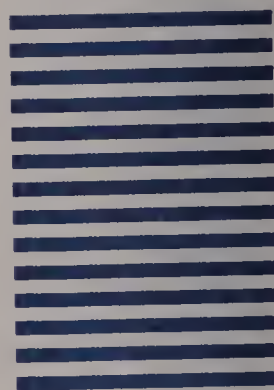
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MANY THANKS

This year's CIO-100 is the brainchild of many people. We wish to thank the consultants, CIOs, financial executives, journalists and CIO staffers whose advice and support helped bring the CIO High-Performance 100 Issue to life.

Mark F. Paulson, a partner with A.T. Kearney, deserves special thanks for providing the methodology we used to compare companies across industries. But many other consultants helped us find appropriate performance measures. They include Ernst & Young's Rick Swanborg, Ron Brzezinski of Coopers & Lybrand, Tony Rich and Pete Bott of Andersen Consulting, and Ernest von Simson of The Research Board. Two financial officers, Joseph Fermano, vice president of finance and treasurer of Blue Cross/Blue Shield of Massachusetts, and Ray Howell, Motorola's corporate manager of finance management development, also helped us find ways to measure efficiency, effectiveness and competitiveness.

Ernie Edwards, the vice president and controller of Alcoa and vice chairman of the Financial Executives Institute; Joel Novak, president and publisher of *Electronic News*; David Morgan, CIO of the City of Dallas; Mike Hale, Florida's director of information resource management; Ellen Schubart, editor of *City & State* magazine; Peter Liu, director of the office of management and budget of the City of Miami Beach; and professors Robert Eccles and Richard Nolan of the Harvard Business School provided invaluable assistance as well.

Last but not least, thanks to CIO staffers Carol Spach and Beverly Bligham for their beyond-the-call-of-duty assistance.

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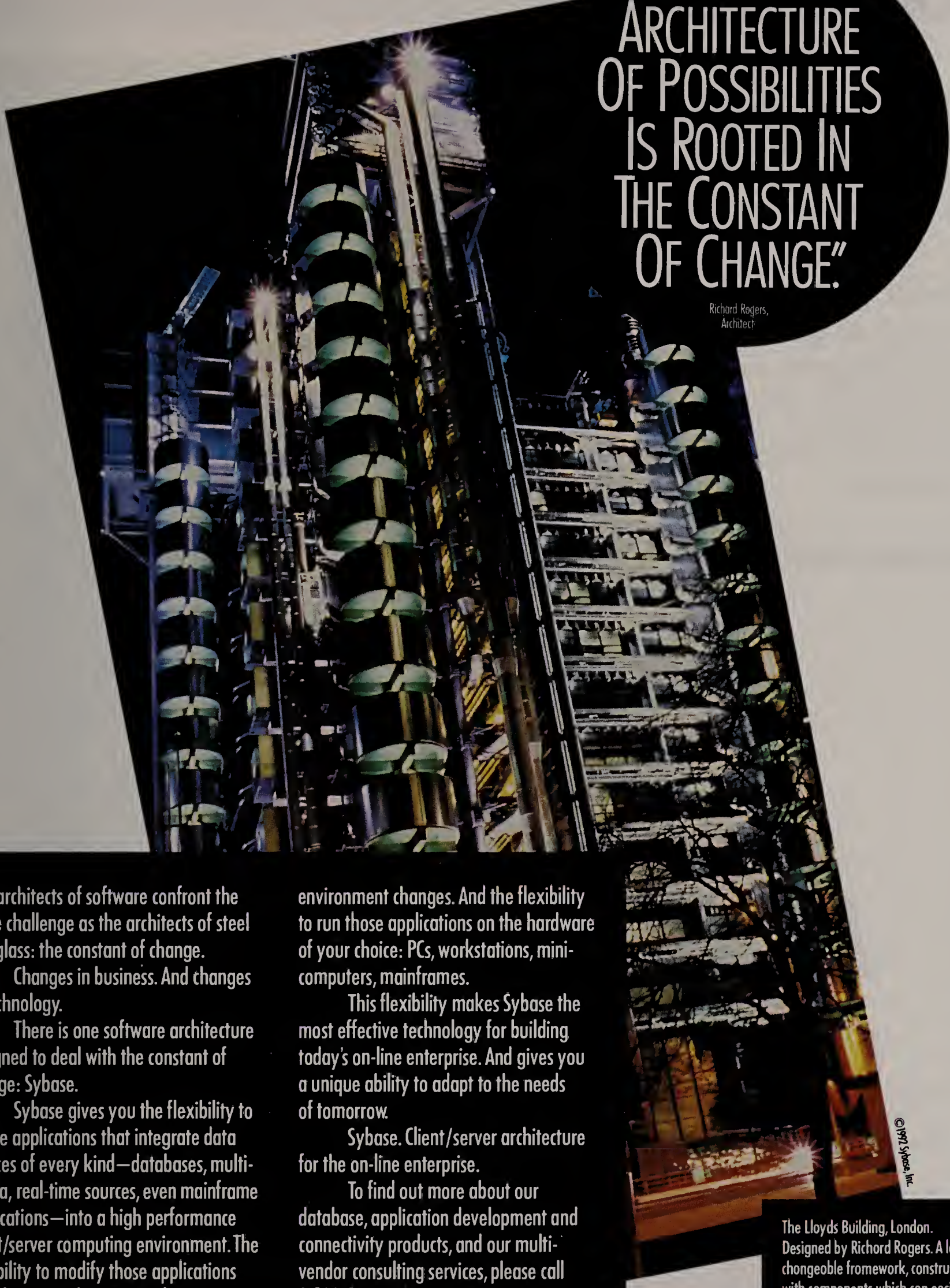
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CLIENT/SERVER ARCHITECTURE FOR THE ON-LINE ENTERPRISE

The Mightier Messenger

E-mail applications are spreading across enterprisewide networks to enhance a wide variety of business activities

BY DENNIS LIVINGSTON

Electronic-mail systems are fast outgrowing the boundaries of traditional message-exchange programs. The same store-and-forward technology that lets users send text-based files without the hassle of telephone tag is being used to transmit graphics, software, research reports, order forms and a variety of other materials between individuals and applications throughout the corporate enterprise and beyond.

At the same time, long-promised solutions to the problems of interconnecting diverse E-mail systems and synchronizing their directories are appearing. And a new wave of programming interfaces should make it easy to send information directly

from mail-enabled applications without exiting to an E-mail system.

Many of these developments are taking place on LAN-based E-mail systems, the fastest growing segment of the market, according to International Data Corp. of Framingham, Mass. Networked E-mail products should jump from 20 percent of the estimated \$630 million market in 1991 to 50 percent of the \$1 billion market projected for 1995. This growth is fueled by the spread of LANs and desktop machines into every corner of the corporation as businesses strive to decentralize computing operations.

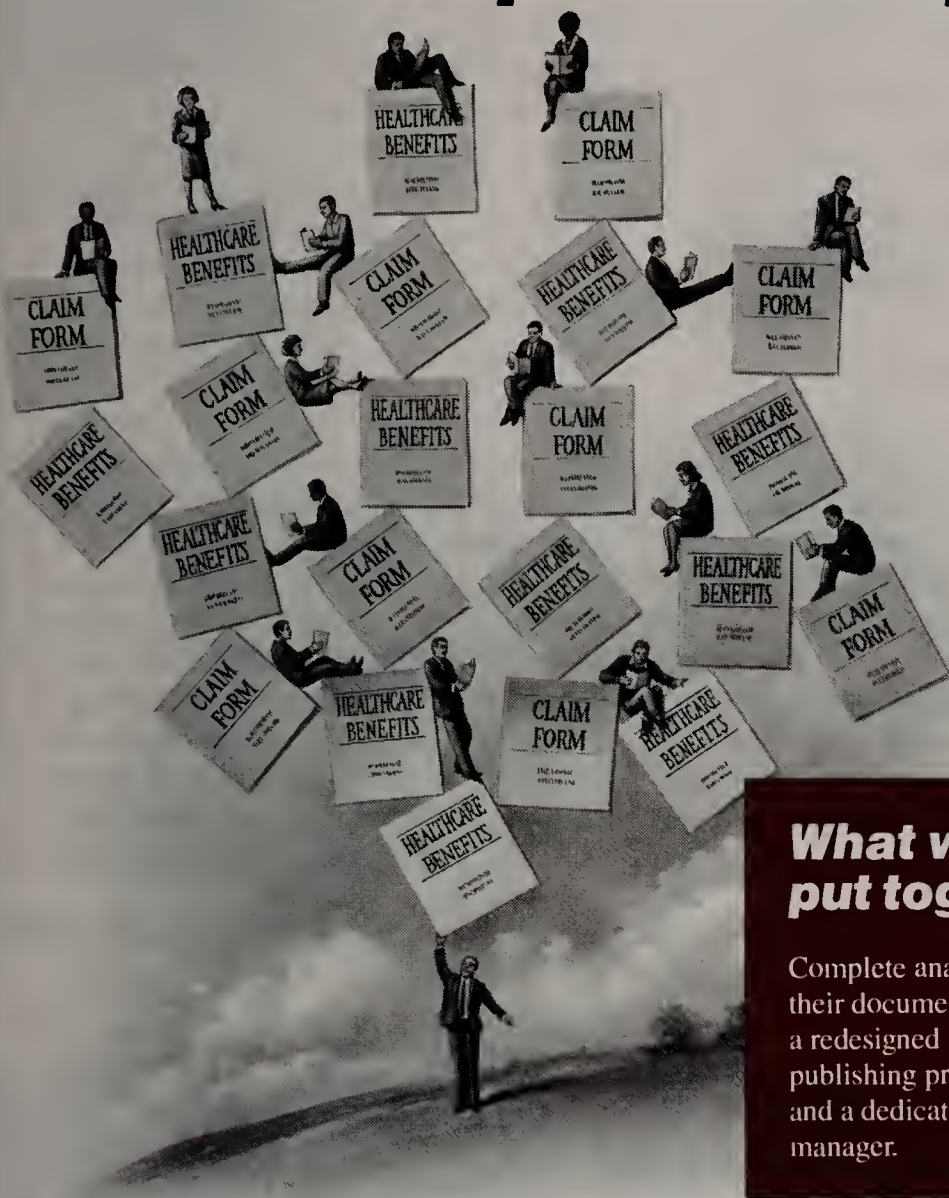
A striking range of applications now taps E-mail services to link individuals within an organization and bring employees together with external customers. For example, Viking Freight System Inc., a general-commodities motor carrier based in San Jose, Calif., supplies customers with a homegrown E-mail system and related EDI applications. Customers use the package to communicate with Viking freight-terminal managers and access data from the company's mainframe to verify that shipments were picked up as planned and are proceeding on schedule. They can also obtain information on delivery dates and freight charges and get standard rate quotes. Such shipping-status data is vital to Viking's customers, who want to reduce inventory costs by receiving goods only when needed.

Some electronic-mail systems can be used to create and transmit business forms in order to improve the efficiency and reduce the cost of manual forms-filing procedures. For example, INTELSTAT, a Washington-based provider of satellite communications services, has automated vacation scheduling for its employees using a customized leave-request form created with the BeyondMail Forms Designer from Beyond Inc. Employees



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fill out a form from the BeyondMail menu. The form is sent to a supervisor for approval and then to a database server, which searches the organization's database to confirm that the employee has vacation time available, updates the record and sends an approval confirmation to the employee.

Other workgroup applications built by BeyondMail users provide inventory and pricing updates, expense reporting, check-request routing, sales-lead management, spreadsheet consolidation and access to online news services.

Beyond is one of several LAN E-mail vendors tackling the issue of how to filter and prioritize E-mail and fax messages flooding user mailboxes. Users can customize the way their mail is managed using a rules-based messaging language. For instance, the system could be instructed to prompt users with an alert when messages from designated

A striking range of applications now taps E-mail services to link individuals within an organization and bring employees together with external customers.

addresses arrive, or to forward messages to a fax number at a hotel.

Carey Heckman, director of messaging products and marketing at Novell Inc., suggests that E-mail can play a major role in automatic information dissemination. For example, when a telemarketer contacts a prospective customer, someone who has requested literature on a particular consumer product, say, the corporate database could use that

person's zip code to send a message alerting the appropriate dealer to the potential sale.

Also on the horizon are mail-enabled packages that utilize E-mail as a vehicle for people-to-application and application-to-application communications. For instance, at present users send a spreadsheet created in, say, Lotus 1-2-3 by leaving the spreadsheet file, entering an E-mail system, bringing the spreadsheet into the text and transmitting the text. Then it's back to the spreadsheet to continue working.

"You would never have to leave a spreadsheet that was mail-enabled," said Brownell Chalstrom, general manager of workgroup applications at Lotus Development Corp. "A message could be sent right from the application to another person or another program, such as a database system."

One barrier to the development of mail-enabled features has been the lack of a widely adopted, common set of messaging-application pro-

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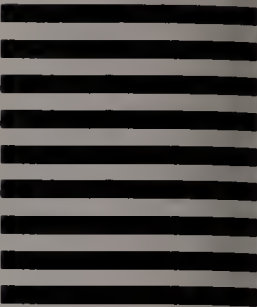
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gramming interfaces. In the absence of standard APIs, software developers must tailor a messaging application for every E-mail transport system whose services it is supposed to use.

But that may change as a result of recent developments. Apple Computer, Borland International, Lotus and Novell have joined forces in the Vendor Independent Messaging (VIM) consortium. An application that uses VIM specifications will be able to communicate with any E-mail system that does so as well. And VIM will be supported by a wide variety of operating systems. "We'll see mail-enabled applications compatible with VIM over the coming year, including the next versions of such Lotus products as Notes, Freelance Graphics and Ami Pro," said Chalstrom. The cc:Mail division of Lotus is also moving to adopt VIM for its E-mail offerings.

The Messaging Application Programming Interface (MAPI), an al-

ternative system being defined by Microsoft Corp. and third-party developers, allows Windows applications to create, transfer and store messages. The forthcoming version 3.0 of Microsoft Mail for PC Networks will incorporate MAPI calls, as well as such features as message filtering and object linking and embedding (OLE). OLE lets users bring documents, sound, graphics, animation and other objects from Windows applications into mail messages.

Microsoft also expects that basic mail programs will be built into operating systems within the next few years, according to Laura Jennings, group product manager at the company's Workgroup Applications Division in Redmond, Wash. "Eventually it should be just as easy to send messages by dragging objects to a desktop outbox as it is to send material to a printer," she said. "There's still plenty of room for vendors to supply advanced messaging applications, even when the operating sys-

tem takes care of basic mail functions."

Users who extend the utility of store-and-forward technology must still ensure that messages get through across the diverse E-mail environments that characterize many large corporations. Interconnect solutions based on LAN servers are available from several vendors. Novell recently introduced NetWare Global Messaging, a set of protocol modules implemented on NetWare '386 servers. Novell claims that its product is the only messaging service based on a network operating system that provides integrated support for multiple messaging protocols, including the company's own NetWare MHS. NetWare Global Messaging will also support VIM, MAPI and the X.400 API, among other interfaces. (X.400 is an international messaging connectivity standard defined by the Consultative Committee for International Telephony and

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LAN-Based E-Mail Systems

A sampling of vendors and products

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Microsoft Corp. Redmond, Wash. 206 882-8080	Microsoft Mail for PC Networks Microsoft Mail for AppleTalk Networks
Novell Inc. Provo, Utah 800 453-1267	NetWare MHS, Personal MHS NetWare Global Messaging
Soft-Switch Inc. Wayne, Pa. 215 640-9600	Soft-Switch Central SNAPI Server

Telegraphy [CCITT].)

A popular host-based approach to linking E-mail systems is Soft-Switch Central, a multiprotocol E-mail switch from Soft-Switch Inc. This product runs on IBM MVS and VM platforms. A Unix version is forthcoming for customers without IBM mainframes.

Soft-Switch Central acts as an enterprisewide E-mail backbone that supports several widely used protocols, including X.400, IBM's SNA Distribution Services (SNADS) and Internet's Simple Mail Transport Protocol (SMTP). Soft-Switch also provides gateways to a variety of proprietary host- and LAN-based E-mail systems, the Soft-Switch Network API (SNAPI) for mail-enabled applications, and E-mail network-management tools.

But even a backbone solution works best when there are fewer E-mail systems involved. Bank of Boston had 22 incompatible E-mail systems. "We decided to pick one E-mail package per compute platform and integrate the resulting three systems via Soft-Switch," said Chris

Stormont, director of network application services at the bank. "That's still more cumbersome than you would expect, but not quite of the same magnitude as before." The bank has standardized on TOSS from NBS for an IBM 3270 mainframe, Digital Equipment Corp.'s All-in-1 at the midrange level and cc:Mail for LAN machines.

It is also more difficult to synchronize directory updates across different E-mail systems—to make sure that address changes made in one system's directory are reflected in other directories to which it is linked. If directory updates are not synchronized, users may end up with different addresses in various E-mail environments as they move around an organization. It may also be difficult to locate remote users on interconnected systems without getting their E-mail address by telephone or letter.

The Directory Exchange (DX) architecture from Retix of Santa Monica, Calif., is one recent attempt to resolve these dilemmas in X.400 networks. One component of DX is maintained by a central server that stores an organization's whole directory and distributes updates throughout the enterprise. A second component goes into front-end E-mail systems. DEC, Soft-Switch and Sprint International are among the companies that have announced their intentions to allow access to their directory servers for DX-compliant messaging systems, as does Retix's own OpenServer 400.

"DX offers a relatively simple way to send directory information from a hub to an organization's existing proprietary systems," said Jim Neiser, associate vice president of mar-

keting at Retix's OSI business unit. "You can leverage your current investment and get on a migration path to the X.500 standard." The X.500 Directory Services protocol, another CCITT effort, is intended to help users obtain a person's address from any compliant directory.

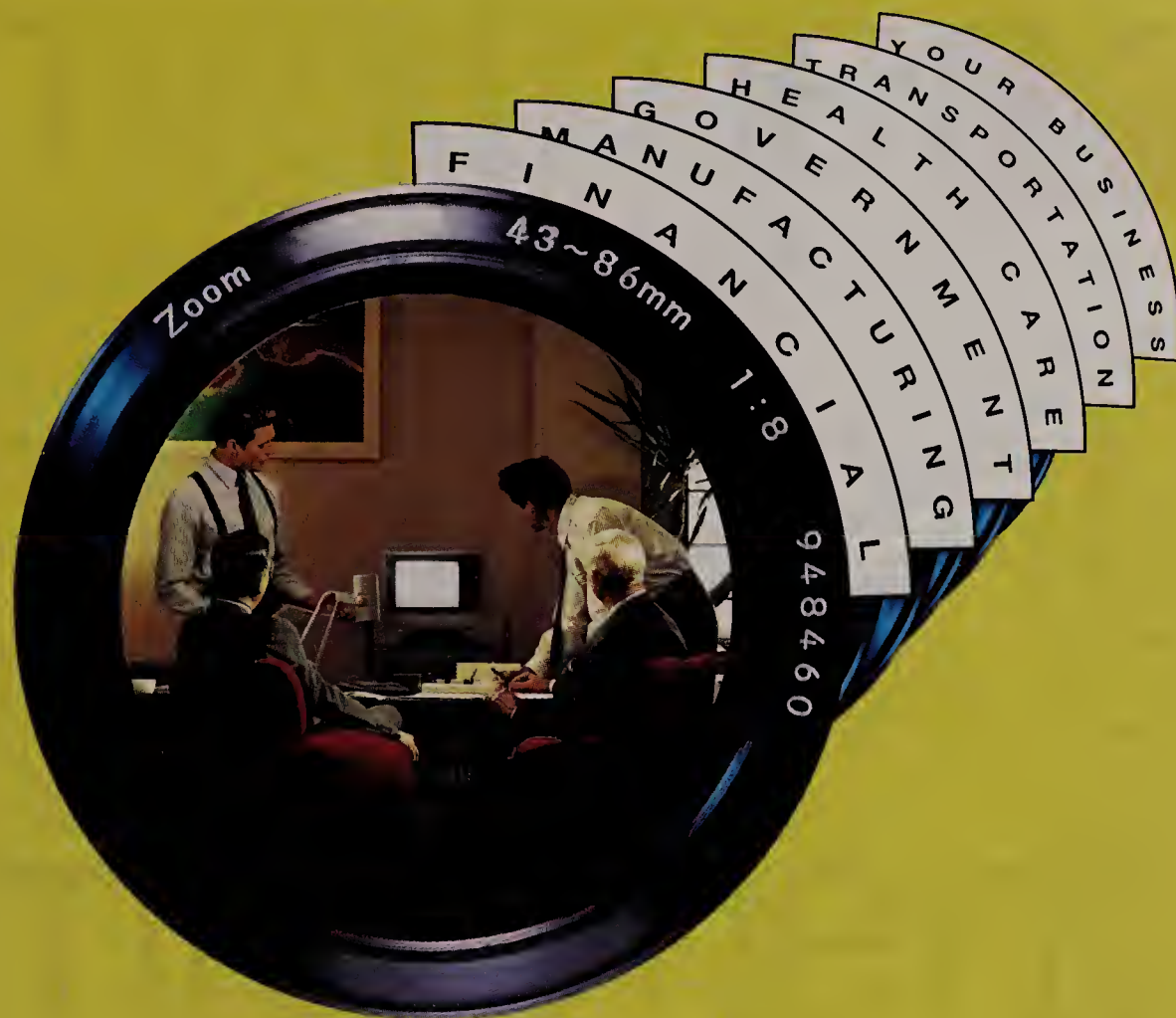
Banyan Systems Inc. addresses directory problems by integrating its StreetTalk directory service into messaging, security, management and other features offered by the company's Vines network operating system. As a result, network administrators have only one set of user and network resource names to manage for all services. Naming information is also automatically updated throughout the network.

Bob Newber, Banyan's product line manager for network services, emphasizes that manageability and cost of ownership are key issues in running today's E-mail systems. "Market reports show that you can spend a lot more money keeping up an E-mail system than installing it," he said. "Our ownership costs are less because we automate a lot of administrative tasks in Vines." He hopes to further reduce such costs in a forthcoming release of Network Mail, a plug-in option to Vines that improves traffic-handling by compressing messages at a four-to-one ratio and using multithreaded technology to process them faster.

These developments promise to bring electronic mail to its full potential as a strategic information-handling resource. "The community of E-mail creators always understood that this technology could be used for more than simple text transmission," said Mike F. Cavanagh, executive director of the Electronic Mail Association in Alexandria, Va. "But only now are a broad range of applications and services enabled by E-mail coming on-stream as a result of electronic mail's pervasive use. Many of these newer applications are geared to enhancing workflow efficiency and improving mission-critical operations." [C/O]

Dennis Livingston is a freelance writer in Brookline, Mass.

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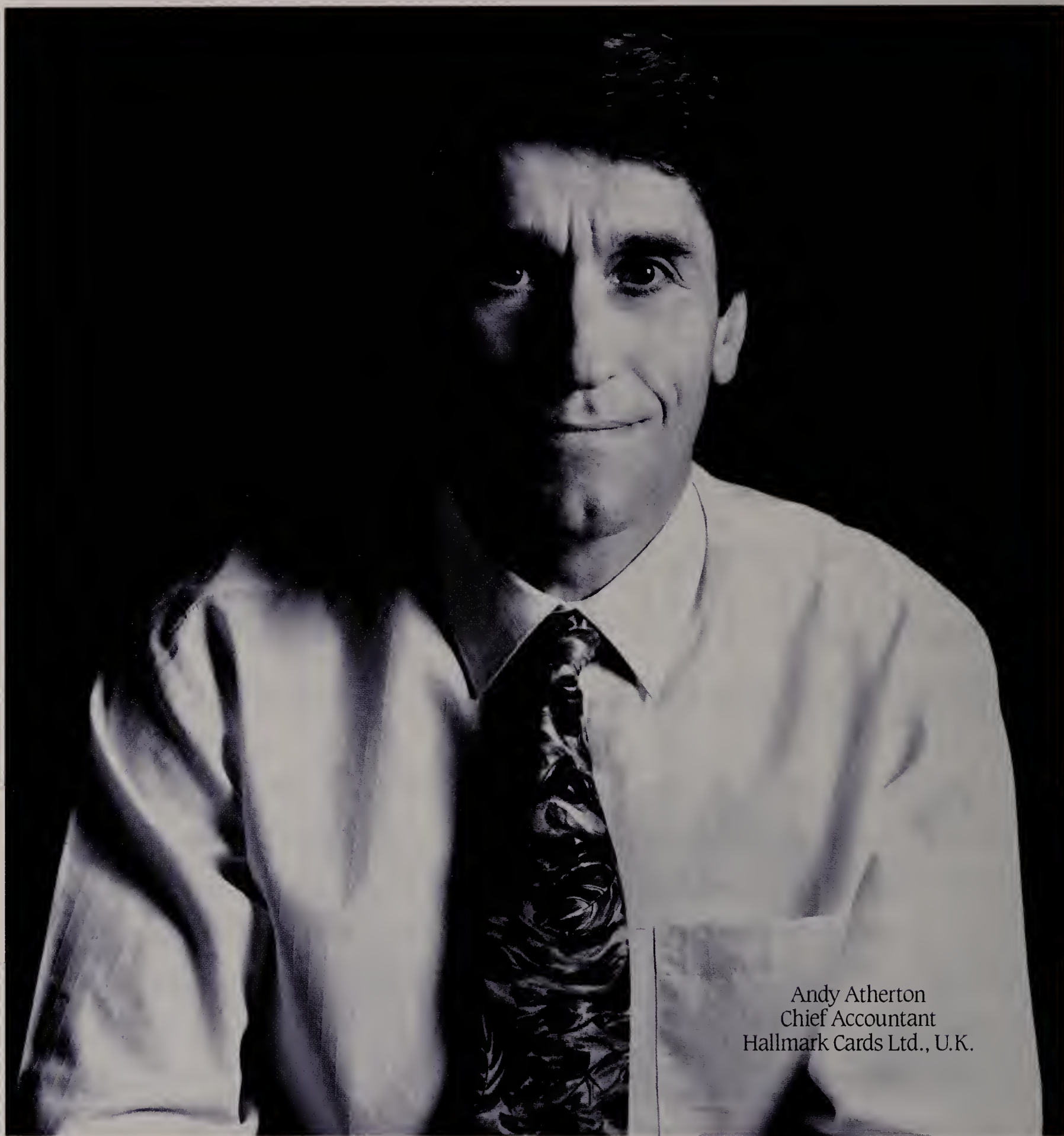
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THE MAGAZINE FOR INFORMATION EXECUTIVES

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Description of business:

Industry:

IS executive making submission:

Title:

Telephone:

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Signature:

Name of non-IS executive sponsor for whom system was developed:

Title:

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Description of System & ROI Methodology

- On a separate sheet of paper, please type a description of the system in 300 words or less. Include: the system's date of implementation; its business objective; what it actually does; its users, enabling technologies and technical platforms (including major vendors); the overall benefits it has provided to the business, and its "soft" returns (e.g., employee motivation, better decision-making).
- Also, please briefly describe the methodology your company uses to determine the dollar-value return of IT investments.

Return on Investment

Gross Return:

Additional revenues attributed to system (e.g., new revenue streams, additional revenues on existing products):

\$

Direct cost savings (e.g., labor, material):

\$

Increased productivity (e.g., more goods produced, better customer service):

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Indirect cost savings (e.g., new hiring avoided, penalties from government regulators avoided):

\$

Total:

\$

Costs:

Acquisition costs (e.g., hardware, software development, systems integration, training):

\$

Maintenance costs (e.g., updating system, maintaining and replacing software, adding users):

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THE MAGAZINE FOR INFORMATION EXECUTIVES

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March 17, 1992
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Informix Database Technology Helps The Seattle Seahawks Score Big In The NFL.



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The Seahawks, a pioneer in bringing sports franchise operations on line, made a decision to move their proprietary database to a flexible UNIX system. The new system had to store and track vast amounts of data, including statistics on virtually every football player on a college or professional level worldwide. The system had to be technically sophisticated, comprehensive, and easy to use by front office and coaching staff alike.

The Seattle Seahawks chose the Informix UNIX solution.

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The Informix database tracks player statistics from college through professional football. Seattle scouts use laptops in the field and download their reports directly into the central database over phone lines.

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